TRANSPORTATION ENGINEERING JOBS PANEL

Notes from Dec 14, 2023 Discussion + Survey Highlights

PANELISTS:

Dr Donna Chen - Assoc Prof at Univ of Virginia, 8 years (+ 3 yr consulting in Dallas)

Dr Dan Fagnant - Sr Manager at General Motors, 8 years (+ 3 yr as asst prof at U Utah)

Dr Jason Lemp - Principal at Cambridge Systematics, 13 years

Ben Loeb - Principal Engineer at Philadelphia/Pennsylvania's MPO (DVRPC), 6 years

Brice Nichols - Senior Modeler at Seattle's MPO (PSRC), 10 years

Dr Natalia Zuniga - Engineer at Argonne National Lab, 3 years (+ college teaching & consulting in Costa Rica)

ONLINE SURVEY RESPONDENTS:

13 UT TE graduates responded online, with avg of 8 yr work experience. (6 with PhDs, 6 MS, and 1 BS). Questions were asked online of everyone, & then 2 or 3 responded during live panel, with added questions live. All info summarized below.

QUESTION 1: What do you wish you could change about your past educational & other decisions (on degrees, directions, thesis topic, employers, etc.)?

- **A stint in consulting before joining a public agency** probably would have helped boost my experience levels, but I was happy that things worked out as they did. I think stopping at a Master's degree was the right call for me, but I sometimes regret not finishing out the Ph.D. as a way to open a few more opportunities in teaching and research.
- I would've liked to focus a little bit **more on programming** in grad school, taking up some CS courses, and getting a general sense of best practices in programming. Although I received my MS in Stats, my research and courses were geared towards traditional stats (both frequentist and Bayesian). I would have liked to have more exposure to deep learning and would've liked to be challenged more mathematically.
- **None.** I was lucky to have great mentors.
- My interests have never been super technical or analytical. I'm more of a generalist interested in how the physical world is put together, so I'm glad I went into the workforce with **only a BS Civil degree**. I have been very successful and risen through the ranks at my company quickly, learning most of what I do on the job. I started as one of many in a transportation design group and now lead a statewide team of 20+ EITs, PEs, and CAD professionals preparing schematics, plans, specifications, and estimates for pedestrian-focused projects. It

doesn't take a lot of analytical or modeling skills for what I do, it's mostly just a firm understanding of geometry and workforce management to run a statewide team. I wouldn't necessarily go back and change educational decisions of the past, but I am looking to the future and contemplating **advanced engineering management MS degrees, PMP certification, or Registered Accessibility Specialist certification to bolster my credentials**.

- I think that **the skills and knowledge needed for a job in the transportation field aren't taught enough**. In undergrad, a student will usually take one transportation class in their school career only if they choose to. In grad school, there are a limited number of courses that get taken due to the brevity of the program, time devoted to research, and the need for non-transportation courses like statistics to support research. The result I see in the field is a lot of people working on the engineering side of planning and design who don't have a good understanding of **basic skills: like geometric design and traffic modeling**, or an understanding of the context of their projects or the history of transportation in America and the mistakes that have been made in the past, or how to not perpetuate them. The most useful class I took in grad school was **Dr. Sciara's bike/ped transit planning class in the planning department**, because it opened my eyes to the history of how transportation infrastructure has been used to divide, exclude, and dehumanize people, and gave me an opportunity to practice my engineering skills in the context of reuniting communities and designing the RoW for people. I think students need to have the opportunity in both grad school and undergrad to **take more classes that dive into the technical side of facility design and planning of networks and facilities**, but these classes should give the history and context of how these facilities have been used in the past to intentionally and unintentionally harm people and should include a focus on designing for safety, human well-being, and community-building. On many projects, engineers may be the only ones available to make decisions, so we need to equip them to make good decisions. While my thesis topic isn't very relevant to my current work, I wouldn't change my degree choice, career direction, or current employer, since all have been instrumental in me being able to do the work I do now.
- There is not much I would change. I have had an incredible career working at the highest levels of State and local government on exciting transportation projects and initiatives. I have been fortunate to have managers and mentors who trusted and coached me to grow my leadership and management skills. I might have changed my thesis topic to something **more directly related to innovative project delivery and/or design-related**, if there were funding available for that somehow.
- I got my MS and PhD from two different universities. I think the duration of my graduate study can be reduced if I completed these two degrees at one university. But life is long, so one or two years do not matter much, especially given the fact that UT is top-notch in transportation.
- It would have been great to have a BS in Civil Engineering coming into graduate studies.
- I'm not unhappy with how things turned out. In retrospect, I could have been open to applying to a national lab earlier than I did.

- I don't think I would have changed any of it, even if the route was less direct. All of my previous experiences have been valuable in my job today.
- I think a **minor** degree or a **certificate** in **Computer Science or Statistics** could benefit my career.
- Focus more on career goals during the Ph.D., & see if I could **spend time doing internships** in the industry during summer months (if project sponsorship would allow it).
- Take some quantitative hardcore modeling econometrics, and statistics classes. If you are looking at qualitative versus quantitative, **go quantitative**. Having analytical modeling capabilities and skills is fundamental. And, **have a big box of tools**. You don't have to know everything, but if you've got a big box of tools that you can pull from. That's gonna set you up well for the rest of your career. When I do interviews, I want you to be able to explain very clearly what you did, why you did it, what the end goal was, what the purpose was, what other methodology you could have used...I want to hear that critical thinking and deep understanding of your model.
- Most of the things I did gave me a robust background to allow me to work in many different areas. Perhaps I would have focused a little bit more on one specific area. Also, **highlighting the rigor & robustness of one's background** could help you along the way. (You can put class names succicntly in your resume, so they know that you have such expertise, rather than simply "MS or PhD" in TE.)
- I wish I took more classes, even if for pass/fail or auditing, to **learn more about methods and skills unrelated or adjacent to my thesis & dissertation topics**. You'll have even less time as an employee to learn new concepts.

QUESTION 2: Do you think your final degree(s) at UT was the right one for you? Why or why not?

- Yes, I learned a ton and worked on a variety of projects during the MS (and as an undergrad intern). I gained a lot of knowledge and experience in a short time. It could have been nice to extend that into a PhD; but, ultimately, I wanted to work in applications of modeling and policy making so I took the opportunity that suited me at the time.
- 100%. The PhD at UT taught me a lot - **not just knowledge in the field or from courses I took, but the level of research we do, and original thinking that is required** for a successful completion of a UT PhD helped me tremendously for life after grad school.
- My MS degree from UT was a great propelling force for my career. I learned everything that a researcher needs -- **selecting a topic, art of wrapping up papers and writing them well**.
- Yes. UT equipped me with the skills to solve problems and instilled a culture of excellence that meshes well with the company I work with (that highly values those things). Most employers will train you on the specifics for your job, and as you master them and become a leader you then get the freedom and responsibility to chart a course in the direction of your choosing. **It takes time to build that skill level and trust with your employer to rise to a management or technical leadership role no matter what degree you start with.** My final

degree (BS Civil Engineering) was enough to get me in the door, practice design and plan production fundamentals as an EIT, and learn under other experienced PEs. I knew the types of jobs I wanted to pursue while I was a student, and am glad I didn't overeducate myself for the role I sought. If I had stayed on for a MS or PhD and developed deep technical or research skills it wouldn't have necessarily benefited me or set me apart from my peers in preparing pedestrian-focused construction plans.

- Yes, my time at UT opened my eyes to the type of work I want to do, and gave me the means to pursue that.
- I may have considered **a graduate degree in Construction Management**. I did take a Capital Project Finance course from Dr. Gibson during my graduate work and still use the principles I learned in that class in my current work.
- Yes. I wanted to teach; **PhD is a required qualification to teach engineering & transportation**, so I *need* a PhD to fulfill my career goal. UT is a wonderful place to study and make life-long friends.
- Yes, it was a significant support in my current work.
- Yes - it provided a strong mix of technical and research experience, but **by stopping at a master's I was able to get out and have "practical" experience**, which was a good fit for me.
- Yes. Obviously, a PhD is required for a job in academia, but also the UT alumni community is pretty close-knit and it's been great to be a part of this community.
- I was a Postdoctoral Fellow at UT; and, although it was short (1 year), it significantly helped me in my current career. First, I learned so many new things and broadened my knowledge in transportation engineering by working on topics that were slightly different from my dissertation topic. In addition, working with my supervisor, who provided opportunities for involvement in different tasks, was a great and essential experience to get ready for my current job.
- Yes -- I combined my Ph.D. with a M.Sc. in Stats and that gave me multiple options for career.
- Yes. I maximized my time at UT (even if I regret not taking more classes).

QUESTION 3: What are the best 2 to 4 pieces of advice you can give current UT grad students in transport engineering (TE), in terms of charting their future?

- **Your network is just as important as your knowledge and skills.** You never know how a friendship or working relationship can shape your life, so **always look for opportunities to meet new people, foster relationships**, and be open to new experiences. This also works both ways - be the kind and supportive person that your colleagues need to build a connected community. I still have to remind myself that these skills are just as important, if not more important than technical skills when it comes to living a full and meaningful life. **TRB is a great organization and they are often looking for young members** to fill committees, especially from public agencies. Sign up as a friend of a committee, go to committee meetings, and reach out to people doing work that interests you. 3) **Choose a lifestyle and career that suits you.** I found a great organization that I wasn't planning on working with that

long, but I keep finding that having good coworkers, managers, and leaders is essential to a good quality of life, and it makes up for more lucrative pay in a more stressful environment. It also feels good to feel like I have a purpose in improving the place where I'm raising my family. 4) Finding a job is hard and requires luck in timing and connections. **Don't get discouraged if things don't work out as you expected right away.** Eventually, if you keep working hard and staying open to the world, you'll find the right direction. You're in the best TE program in the country, so you'll find your way!

- Distributing resumes/CVs early does not guarantee you get the best job. However, **starting to network early, and identifying the types of jobs that you are interested in** can be quite helpful. Once you know what's out there, it'll be easier to apply to jobs, time course completion for when you expect some positions to open up, and have a higher chance to minimize the gap between graduating and starting your job. This isn't a concern for domestic students, but is quite critical for international students, unfortunately, to ensure no lapses in visas. 2) When working with a close set of colleagues, in a friendly environment, it is common that you may be hesitant to talk about your professional goals and expectations from your job. By that I mean, you may be hesitant to bring up your salary or position (or anything else related to your job), to continue maintaining a friendly relationship at work. Bu**t** in my experience, you never receive what you have never asked for. **Being vocal about your needs, wants, and goals for your job is quintessential to staying motivated** and not being bogged down by overthinking and what-ifs. 3) **Enjoy the time in school. It's not ever only about studies. It's about inter-personal friendships and relationships** that you build along the way. Go out, meet friends, hang out with colleagues, socialize. Grad school is probably the last time that it'll be the easiest to make new friends. A full time job adds some impediments but so does moving to a new city, or even moving to a new neighborhood. It never stays the same after grad school, so I strongly recommend y'all cherish your time at UT! 4) I strongly recommend that students at UT find internships. There's no better way to network and find jobs out there than actively being in the market **for at least a summer or two. It relieves a tremendous level of stress, especially for international students, knowing that there is a job** that is more or less guaranteed (if the internship experience and feedback were all great, of course). 5) **Location is as important as the job. If you don't have something to do after work or don't find like-minded people as easily at a particular job location, it can severely degrade your quality of life.** This is not to say its true for everyone, but I was keen on prioritizing my locations as much as I was keen on prioritizing the job I chose.
- Academic job tips: 1) Rejection does not mean you are not good, it may be that you do not fit in that department. So do not worry too much about rejections. 2) Do not just focus too much on what you have done -- universities want to know your vision which may have some overlap with your PhD topic but **should not be just an extension of your PhD.** 3) Join a postdoc position where you have some freedom to shape your profile for Assistant professor positions rather than being completely involved in a single project. 4) Teaching assistance work seems to be a lot of burden in graduate school, but it helps you become a more confident presenter and a better teacher -- much needed for academic jobs. Please **take some basic teaching**

responsibilities if you have not done so. 5) Supervise PhD students during postdocs and take proposal writing experiences -- all this simplifies your early assistant professorship days. 6) I suggest doing a postdoc and then directly taking up assistant professor. It gives you time to shape your vision and think more independently. It is critical because in PhD, we are so involved in details, but the big picture is important when you become an assistant professor. 7) It is worth **setting expectations for your partner** on how your academic job will look like. It simplifies things in the future. For instance, I told my wife quite early that I do not take full weekends off (only evenings) but will always be available in need and love having holiday breaks. 8) Enjoy while you work hard -- reward yourself with travel. It is so important to keep the bigger picture of life as well (working hard to live life to the fullest) :). All the best. Happy to provide one-to-one guidance to those who want to go to academia.

- Public or private? Working for the government (public service) is great for more stable/predictable work hours and good health insurance with a trade-off of lower pay and potentially lower retirement benefits. Private sector is higher paying but comes with an expectation of putting in extra effort when a deadline is looming (less predictable schedule). My advice is to embrace the extra effort while you're single, or have a significant other but still without children, and **use these early years to earn as much $ as you can and invest in yourself and your technical skills learned on the job. If you already have kids and a hectic life, public sector work might be more attractive**. After the kids are grown up enough (early elementary school age) a shift to the private sector can make you an attractive job candidate b/c employers highly value those who know how to navigate the internal workings of a local government. **If you like working in a rigid, defined structure with processes in place then a big company or government job might be right for you. If you like to do things your own way, small private firms are better**.
- Find what you want to do, and **don't necessarily feel stuck in the topic of your thesis. Do what you're passionate about**, but make sure to allow the time and energy for all of the other things that you love in life. **Remember that the purpose of transportation is to serve human needs, and always design/plan/analyze for humans, not just for cars or for "the network".** Continue to pursue learning beyond the conclusion of your school days. **Not everything is taught in school, and what's taught is never perfect. Knowledge is always evolving**, and especially in this field, the people who will make a positive difference are those who continue to seek out opportunities to learn. Don't limit your learning to your narrow field either or to technical engineering knowledge, seeking broader knowledge will help you to understand the context of your work and to make better decisions.
- Network, Network and **do more networking**. Find your passion. Talk to industry contacts. **Resume and interviewing skills** are critical. Be confident!
- I would recommend that the current UT graduate students decide or at least think about *early on* what they want to do. If they are passionate about teaching in college or conducting research in a more independent environment, PhD is a necessity. If they want to make impact in the transportation industry as a practitioner/policy maker, MS may be sufficient. After obtaining a PhD, **choosing between a research university and a teaching**

university is also an important decision, because they are quite different from each other and require relatively different skill sets. I would also recommend **participating in student clubs as much as you can while at UT and continuing active participation afterward**. great sense of **belonging and fulfillment** can be achieved by connecting with people who share similar passions/goals and by contributing to the organization, the profession, and the society.

- It would be helpful to be prepared to work in the industry sector as jobs like traffic engineering and highway engineering are plentiful. You should be prepared to relocate. **Don't submit low-quality papers to journals, it is a big waste of your time**.
- The **employment space is very dynamic these days, and there is a good chance you will have many job pivots over your career.** So, when you are looking for a job or an opportunity, it is OK to focus on something you are passionate (or interested in) *now*, even if it might not seem like something you see yourself doing 3 or 5 or 10 years down the line. Obviously, you don't want to just be indulgent and blow off any long-term planning, but that shouldn't mean sacrificing what you have enthusiasm for. A counterpoint to this is: **keep your mind open and be willing to consider options that you are unsure about.** This might mean something that seems out of your expertise/knowledge, or too difficult, or maybe even boring. I have found many opportunities, interesting work, and great coworkers by trying out things that I wasn't really certain I was a good fit for. Be curious, humble, and diligent. 3) As a grad student and also in your early career you will have the chance to meet a number of people in the industry - academics, consultants, government employees, postdocs, etc. **Make an effort to try to get to know what their current work situation is, and ask:** what is their day-to-day routine? what is their workplace environment like? how about their co-workers? do they enjoy their job? (Also: what is it like where they live?) Use this as an opportunity to imagine yourself in their shoes and whether or not this would be a career/life direction you would like to pursue.
- **Build relationships with your peer graduate students.** This is the best time to make authentic connections with other people who will be working at expert levels in transportation. The transportation professional community is small! You will cross these people again in your career, and it's easier to make the connections now than later when you have to purposefully "network." 2) But **you also need to "network." Your professional network is your opportunity**. Quality of your work is important but you won't get a chance to show that high-quality work unless you have the opportunities. 3) When evaluating internship/fellowship/early career opportunities, **really focus on the opportunity to expand/grow your skills, rather than purely compensation.** The money is important, but earlier on in your career, you have a greater appetite for risk. This is the time to get as much information about various career paths/opportunities/skill sets as possible so that you can find a fulfilling (and financially feasible) path for yourself. 4) Growing in your career requires some level of discomfort. If you find yourself too comfortable, you are probably not growing your skills (and will be bored soon!). **Be comfortable with discomfort**.
- **Share your job search package with as many people as you can**, especially those who just passed the job search process and seniors, and ask for their opinions. Receiving feedback

from people with diverse perspectives will help you prepare a better package/resume. 2) Although grad life may seem a bit overwhelming, especially when you are involved in different tasks and research projects, it prepares you for your future job. Practice pays off, so work hard! 3) Location is very important, even in your work efficiency. If you get a job offer from a city that you have never been in, plan a visit immediately before making any decisions.

- Look for many internships to **test what type of work environment you like the most** 2) Try to **set a career goal** and focus your Ph.D work on that. For example, if you want to become a professor and go to academics, participate in proposals and write papers in good journals, if you want to go to tech and code, practice for coding interviews for a long time, if you want to go to general consulting, focus on practicing for interviews as well and line up your course work for those options.
- Quantitative skills are important, and **being able to communicate what it is, what experience you have, and what it is you can bring** is also important.
- Having quantitative skills is a primary role of what we can learn in grad schools. Also, **being able to translate these skills in a way that you can communicate findings into the real world** is important.
- **Use the career center** (do the TA/instructor certificate, have them revise your CV/job statements) **& writing center** (writing workshops on Saturdays + Grad Student writing lounge + feedback on your writing). **Go to workshops & seminars hosted by non-TE groups** (ORIE, Energy Institute, CRP)... you'll need to find out how to join their listservs. You'll meet new people, learn about new topics, and job opportunities. **Do your research on fit for the job** (are you contributing something new, complementing/overlapping with others, competing with others at this job OR peer institutions/labs) and determine then if you're up for the challenge to compete or wish to be more of a support/complement position.

QUESTION 4: How much do transportation engineers get paid in different levels (degrees & age/experience) & job types? How much negotiation is typical or warranted?

- I started at $48,000 in 2017, and that was considered low at the time. The job market has changed a lot since then, so that's out of data information. **Negotiation depends on the type of work.** If you're looking at travel demand modeling, and they like you, you probably have pretty decent leverage in negotiation. If you are in something like traffic, then maybe not so much. You can work up the latter pretty quickly, especially MPO. So **the starting salary is not super-important as you progress enough**.
- When I was hired at the university in 2014, it was $110k as a tenure-track professor. When my group at GM is hiring in the industry, for somebody straight out of a Master's degree program, usually no experience or little experience, maybe a year or so, will be $70-80k. If we are looking for a PhD, you can probably throw another $10k on top of that. PhD will usually come in as a non-new hirer. We have levels 5 through 9, and then it goes to the executive. If

you are coming in as a master student, you are 5. If you are coming in as an experienced hirer as a PhD, even if you don't have work experience, it still counts and you are probably 6. On top of that, there's also a bonus structure. If you overperform the expectations, you will get more. In academia, there is obviously negotiation. In industry (GM), **if you are a new college hirer, you will have 0 negotiation power** because they want to treat all of the new college hirers the same. **2 modifiers: base level + individual modifiers**.

- When I started back in 2010 with a PhD, I started 70k, at the time, it was probably about a 10k gap between someone with a master's versus a PhD. Coming right out of school, you don't have a whole lot of negotiating power. As you move up the ladder, you find that there are opportunities that you can have some negotiating power. But **they are relatively rare in the same organization. If you're looking to change positions or organizations, then you will have a lot more negotiating power**.
- When I graduated, I started as a postdoc with about 70k at UT austin, then I moved to a national lab as a postdoc at around 95k, which compared to other universities and postdocs was very competitive. Working a little bit long time, there was a big jump from there. It is not specifically government, but the salaries, and increments coming next year are based on the DOE sets up for us.
- Academic salary structure is really different because you have a 9-month base salary which is guaranteed and then the other portion you cover through basically budgeting your own salary into research projects. On top of that, some people will do some form of consulting depending on the university you're at (up to 8 hour/week, maximum, to avoid excessive "moonlighting" & distraction). Faculty at MIT & perhaps Stanford have to cover more of their salaries each year (e.g., 50% at MIT, I believe), so they often work for private companies extensively on the side, and cannot publish a lot of that work, which can be a problem for the students and interaction at conferences, etc.

QUESTION 5: Transportation is evolving rapidly now, so how do you get to know the latest developments in the field at work?

- Your fresh knowledge starts to expire after a couple of years, if you're not fully paying attention. **TRB is a good opportunity. Having a good network of other folks in your field and staying engaged in conferences** are good for maintaining access to your peers and understanding what they're doing. Also, **have connections to the university if you have a nearby university**, pretty deeply and contribute on projects with them and attend their workshops, webinars and things as much as we can.
- Getting information is built-in the job of an academic. I like to **go to seminars in other departments (public policy, etc)** that may be relevant to my research, maybe not directly, but just to get some sense of what's going on beyond transportation.

QUESTION 6: How does work-life balance vary across different job categories?

- Generally speaking, in the **public sector**, you're going to have **a lot more work-life balance**. Those at the MPOs tend to work 40 hr/week, from home, as they wish. Those at consulting firms probably worker closer to 50 hr/week, and have to travel a lot more. Those in academia have a lot more intellectual flexibility than almost anyone else, and they work 40 to 60 hr/week, depending on what they want to do. There are a lot of cool things one can do from a perch in academic (e.g., interviews with journalists for the public at large, speaking to middle schoolers, writing books & newspaper op-eds, traveling to major cities around the globe for neat conferences), but it means it's hard to get your week down to 40 hr.
- **Academia provides a lot of flexibility, especially over summertimes & winter break periods.** There are weeks when I work a lot, typically when there is a proposal due. I can schedule everything I do on campus and have some time for kids and family.
- For the national lab (ANL), the expectation is between one to three days per week in the office. We work mainly on models and most of things we can do from home. We usually go when we have meetings with sponsors, have presentations, or have meetings with the whole team.

QUESTION 7: What is the most effective way of networking?

- **Go to every conference that you are invited to**. At meals like breakfast and lunch, chat with people around you and connect what you do at work.
- At the conference, sometimes it is difficult to network, you can try to interact with presenters after the conference and say 'I work similar to your work.' Bring a business card. it is important to attend social events after the conference. **LinkedIn** is more useful and post on it so that people get to know what you're doing.

QUESTION 8: How can we students better prepare for jobs in academia?

- First & foremost is having **lots of publications.** Also, understand who is at the university, what they're working on, how your research aims could potentially fit with them, how you would have ideas coming in.
- For academic jobs, the biggest hurdle is **getting through the first cut**. For a tenure-track position, we typically receive 200-300 applications per position, that's a lot of things to read. We pay attention to the first couple of pages, more than the last fourteenth or fifteenth. Your cover letter is also pretty important (why you're interested in this university? what resources do they have there that would help you succeed? who can you collaborate with?) **Think about people who were successful in securing the kind of job that you wanted a year, 2 years, 3 years ahead of you.** Know what their package looks like. Think about how you can get experiences on your CV that would be valued higher by hiring committees.

QUESTION 9: Are there specific expectations the industry has for PhDs versus MS holders?

- For a PhD, you are going to come in at a higher level, so there's more that is expected of you, there will also be less that is expected of you in certain aspects. You have certain skill sets that you expect, because that's where you hire them, and you expect them to get those other skills as they are longer in the company. It is an expectation. But it's not that they're going to have those skill sets right out the door.
- Most of the time, we are hiring for the same skills and the expectation of someone that has a PhD versus a master's wouldn't be totally different. However, when I came into work as a PhD, I felt like there was more credibility and it helped me in choosing projects I wanted to work on.