

RECRUITMENT

Engineers by Design

When job and career fairs failed to recruit engineering graduates to the North Dakota Department of Transportation (NDDOT), officials tried a different approach. The NDDOT partnered with the Upper Great Plains Transportation Institute, on the campus of the North Dakota State University at Fargo, to create the Department of Transportation Support Center. The Center provides internships to junior- and senior-year civil engineering students to work with design aspects of actual DOT highway projects. The Design Center (as it's more commonly known) is proving an effective vehicle that allows the NDDOT to benefit from the work performed by students while it enhances the Department's visibility with the next generation of engineering professionals.

As the North Dakota Department of Transportation (NDDOT) reviewed its recruiting initiatives, it realized that its problems attracting college engineering graduates stemmed from students' lack of awareness about the Department and its opportunities for entry-level engineers. Rather than trying to find ways to bring students to the Department, however, NDDOT officials decided to bring the Department and its mission to the students—in Fargo.

Fargo is home to the NDDOT District Office that serves in the eastern part of the state. Fargo is also home of the Upper Great Plains Transportation Institute (UGPTI), located on the campus of North Dakota State University. The UGPTI is one of the U.S. Department of Transportation's thirty-three University Transportation Centers and aggressively pursues its mission to promote advances in transportation.

The DOT's Francis Zeigler (Director of the Office of Infrastructure Support) and Tim Horner (Director of the Office of Transportation Program Services) approached the UGPTI with a proposal to create a Department of Transportation Support Center that provides junior- and senior-level engineering students with work-study internships.

NDDOT used State Planning and Research (SP&R) funds to contract with the Institute, which manages the Center and pays the students. The contract also funds a Center director to administer the program and created a state-of-the-art computer laboratory where students work on NDDOT highway design and development projects.

The DOT found an enthusiastic ally in Gene Griffith, UGPTI Director, who saw the proposed Center as an opportunity strengthen partnerships between the Institute and state government. The University was also receptive to partnerships that provide professional opportunities for students.

The contract stipulated that the Center director be a licensed P.E. NDDOT officials felt they had the ideal candidate in Dennis "Jake" Jacobson, a career NDDOT

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employee who had held various engineering and management positions and was then the Department's Regional Engineer in Fargo. According to Robert Evans, Director of NDDOT Human Resources, "A recent reorganization eliminated several senior positions in the department, which created the opportunity for Jake to move into the UGPTI position. He provides the enthusiasm and direct supervision important to producing the kind of products that make this program successful."

Designed for Learning

The Design Center moved from concept to reality in lightning speed. The DOT and the UGPTI signed the contract to establish the Center in November 2000, and the first work-study students arrived mid-January 2001.

"We started from scratch," recalls Jake Jacobson, "but the level of cooperation between the DOT, the Institute, and the University demonstrates the commitment of each to make the Center a reality."

That commitment is demonstrated by the physical creation of the Center. On a university campus where space is always at a premium, the Center occupies 1,000 square feet on the ground floor of a large classroom building, and houses nine state-of-the-art workstations. Two more are planned.

Robert Evans, NDDOT's Director of Human Resources, has worked closely with the Institute and other DOT offices to ensure the Design Center meets its intended goal. "We had very

specific ideas about the Center and the kind of experience it should provide for the students," he says. "For example, we wanted students to work with real projects, so we didn't skimp on technology that needed to be compatible with DOT drafting systems and other programs. We also knew that the Center director should be a dynamic person who can motivate students, someone who understands our culture and can generate enthusiasm about the Department and its mission. Dennis provides that leadership and program coordination."

The NDDOT Support Center is open from 7:00 a.m. to 5:30 p.m., Monday through Friday. The eight work-study students spend up to 20 hours in the Center each week during the semester and up to 40 hours weekly when classes are not in session. Over the summer 2001, four students worked full time for the Department.

Real Work on Real Roads

Although referred to as the Design Center, the official designation of DOT Support Center better reflects a relationship that involves students in all aspects of transportation planning and engineering and gives them a better understanding of the NDDOT mission and highway systems. The work-study employees work on research projects, scheduling lab time between classes juggling course demands and other activities.

Students support NDDOT central office planners and designers through every facet of a broad variety of projects. For

example, they research project concept information and environmental regulations to write the environmental background for projects. Students conducted 90-1 surveys to locate culverts along the state's roadways. They also worked on seal coats and were involved in a concrete repair and overlay project. They've developed drawings for Interstate reconstruction projects and they assisted in the traffic control design for an Interstate reconstruction project. They are involved throughout a project, however, final drawings are still the responsibility of the Department.

Students are just beginning research activities on two design questions. One effort will involve collecting information from surrounding states and conducting a literature search on the subject of median crossovers for Interstate construction. Another project will entail researching current design practices and policies for designing drainable bases. The third project will be a broad review of pavement smoothness issues. Students will research current states-of-the-art in specifying and constructing smooth concrete and asphalt pavements. It is anticipated that the final products will be instructive to the students and provide either validation of current practices or recommendations for changes to existing Departmental practices.

Over the summer, four students worked full time with NDDOT projects in the field doing preliminary survey work, including channel surveys for

hydraulics. The students shadowed an inspector on the job for a week to get a firsthand feel for the role of inspectors in highway operations.

IT Projects

Computer-savvy students are in great demand throughout academic disciplines, and the Design Center is working with two IT students to initiate feasibility studies and develop proposals for IT projects of varying complexity. For example, students are working on a program that will essentially build a maintenance database that would allow field officials to use PDA (personal digital assistant) and GPS technology to communicate needed repair or replacement of infrastructure or traffic control devices. When operational, if field officials note a culvert end to be cleared, they could use the PDA to communicate the GPS location, which would be recorded in the maintenance database.

According to Jacobson, who serves as Principal Investigator for the project, “There’s a lot of interest in going wireless to track this type of need. We’re currently working with maintenance coordinators in Fargo and a Task Force of NDDOT officials from around the state to evaluate the potential for such a system. We think it has promise not only for tracking maintenance not being done, but also for monitoring utility work.”

NDDOT on Site

Scrutinizing every drawing, shepherding each project, and answering each student’s

questions is Ron Henke, an NDDOT Transportation Engineer III with more than a decade of roadway design experience. Ron works in the Fargo District Office and although he holds a degree in construction management, he has attended NDSU part time for the past few years to earn a degree in construction engineering. By his own admission, Ron serves as coach, mentor, evangelist, math tutor, resident technical expert and recruiter.

From Ron Henke’s perspective, the Design Center program complements the students’ studies and brings the reality of the civil engineering profession into the classroom. “It’s a way,” he says, “for students to apply what they learn in the classroom. My role is not to give the answers, rather, my goal is for students to know where to find the information and how to use it.”

Ron knew students would be aggressive, but he was surprised at how quickly students grasp highway engineering concepts and pick up terminology and processes. The one area where they seem to struggle is the ability to calculate materials.

At the college level, students are comfortable with metric Pascals and kilometers, but they have a hard time understanding English equivalents such as converting acres to square feet or cubic feet to cubic yards.

“Our emphasis is on their ability to learn, not to produce,” he continues. “But students know that what they’re doing is real, and that it counts because they use the same tools as

the NDDOT. They use the AASHTO Green Book, they learn North Dakota specifications, but most important, they have firsthand experience with the process of taking a set of plans from a concept document to final drawing.”

The Center is also addressing workforce management issues. Some newer juniors in the program are assigned to assist seniors to give the latter some management experience in scheduling projects.

Producing Outstanding Products

Grant Levi is NDDOT’s Deputy Director for Engineering and one of the originators behind the development of the Center. “Our primary goal is to generate awareness about the field of transportation among engineering students—and hire as many graduates as we can. In the interim,” he notes, “we are benefiting from the outstanding work these students produce, which includes detailed drawings and concept information that becomes part of our final design plans.”

Initially, there were some concerns about the program from some NDDOT staff and from the consulting engineering community. Some NDDOT staff doubted the students’ ability to produce quality work. Others in the consulting engineering community felt the program might result in reduced business volume. NDDOT concerns have dissipated as a result of the students’ productivity and the professionalism of their work. Consultants’ apprehension

seems to have disappeared with the realization that they too will benefit from being able to hire engineering graduates with demonstrated ability to “hit the ground running.” As NDDOT’s Bob Evans observes, “Whether these students come to work for us or decide to go with a contractor, the entire transportation community benefits.”

Jake Jacobson agrees that the Design Center will play an important role in developing the next generation of transportation professionals. “As students work on NDDOT projects, they are exposed to the planning and design process, which means that they can accept positions within the Department, or with a contractor, and perform the job with little additional training.” he says. “In fact, I’d love to see this program, especially the IT aspect, expanded to include multidisciplinary research with professors in other fields.”

UGPTI Director Gene Griffin concurs. “The Institute’s focus is about creating the relationships, technical assistance, and human capital that will ensure that transportation fosters opportunities throughout North Dakota. Students involved with the DOT Support Center will go to work in the industry, but they may also go on for advanced degrees, which will be the engine to develop new knowledge. It is a partnership, and the Institute and the DOT both view this as a long-term project.”

Finally, the first class of work-study students will graduate in May 2002, but the Department made its first employment offer to one of the work-study interns in early December. Stephanie

The First Hire

I decided to pursue engineering when high school guidance counselors suggested the profession as a way to apply my math and science skills. I started out in industrial engineering, but it wasn’t very exciting, so I switched to civil engineering. Last fall, Dennis Jacobson came into one of my classes, talked about the Design Center, and invited us to submit resumes for internships. I was among the first students to start when the Center opened in January 2001. I’ve been working there since then.

The Center really opened a new world to me. Until then I’d not thought about the Department of Transportation as anything other than people who designed and built roads. I had no idea that they build bridges or test and research materials. Since starting the program, I’ve worked on several projects, including a big Interstate project in Fargo. I assisted with the construction signing. I’ve also worked on seal coats and a concrete repair and overlay project on 23 miles of an Interstate in western North Dakota. For that project I helped finish the concept report and put together the final plans. Over the summer I worked at the DOT Support Center full time, but we spent one week in the field just watching how work was done and learning about the various jobs people do, such as inspectors.

For me, I feel that I’ve learned more in the Design Center than I have in school. It just makes everything we learn in class more real. We’ve been involved in every facet of projects and I can now appreciate what a complex process it is. I feel very fortunate because I was the first intern offered a full-time job after graduation; and I’m taking it!

Stephanie Weigel
Senior
College of Engineering and Architecture
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Weigel (see sidebar) accepted the offer and will join the NDDOT’s Construction Services Division as a Transportation Engineer I after graduation.

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