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I1: Supposed to use two but I think one's enough. I'm going to read this prelude. Why don't you introduce yourself and state that you're a Veteran student.

P1: My name is [redacted], I'm a Veteran of the Army, a [redacted: participant's academic year] here at [redacted: participant's university].

I1: And your major is?

P1: [redacted: participant's major] in engineering.

I1: OK. [redacted] thanks for your willingness – excuse the protocol – willingness to participate in this group I'm Dr. Zacharakis but you can call me Jeff. This is Dr. Fitzsimmons, you can call him –

I2: Eric.

I1: I thought you would want to be called Dr. Fitzsimmons.

I2: I don't use "doctor" except at the airport.

I1: [laughs] And I'm going to be the interviewer and Eric is going to participate. So this is really casual –

P1: Mmhmm.

I1: So we're looking for a conversation about social responsibility which is generally defined as "considering the needs of society above one's self in one's work". We'd like to get a sense of how you define social responsibility and its role in engineering education and your experience with your program at [redacted: participant's university]. Before we start, I'd like to emphasize a few things just to set the stage for today's conversation. We're here to work collaboratively and effectively as a team. We respect each other's time to speak. We respect each other's thoughts

and agree to disagree. We respect each right – each other’s rights to confidentiality in participation and [inaudible 1:48, possibly “and that’s”] probably the most important thing so –

P1: Mmhmm.

I1: - when we use this interview and information in any kind of publication or report your name will be deleted.

P1: That’s fine.

I1: And also any type of identifying criteria like you’re a junior and your major is [redacted: participant’s major].

P1: Mmhmm.

I1: And anything we say is confidential and you’re not doing anything that would jeopardize this right. But really the confidentiality is our responsibility as researchers, you know, one of the best ways to lose credibility is to breach confidentiality and that will affect our entire careers. So, before you start, do you have any questions?

P1: No, let’s get to it.

I1: Ok. When you hear the words “social responsibility”, what comes to your mind first? For instance, what are the words you tend to associate with social responsibility?

P1: From an engineering perspective I think that, like, the engineering ethos –

I1: What do you mean by –

P1: But like, putting safety -

[inaudible muttering from multiple people and loud extraneous noise 2:59]

P1: - in front of profits [pause] like not polluting watersheds down the stream is what comes to my mind just based on my own major.

I1: How would you define social responsibility?

P1: I mean, I guess, let’s see, to mean what’s right for the most people.

I2: That’s a good answer.

P1: Yeah.

I1: So, you gave one example and that was not polluting streams.

P1: Mmhmm.

I1: Do you have any other examples?

P1: Yeah, so, like, I'm just going to do this from my perspective, so, if you cut down a 200 year-old tree it takes years to replace what that tree can do for ecosystem services. It takes 200 years to get that back so that time lost is huge, so, like, just being responsible with resources be it time, natural resources, other people's time.

I2: You mentioned safety too.

P1: Safety?

I2: Yeah, in the previous –

P1: Yeah yeah.

I2: - you said public safety and things –

P1: Mmhmm.

I2 – that's pretty important too?

P1: Oh yeah, putting [pauses] yeah I'm trying to think how to define that.

I2: As an engineer?

P1: Mmhmm. Putting the needs of public safety above anything else is socially responsible.

I1: So this question's not on here but where do you think you got that ethos? Do you think you got it as a child?

P1: I would, yeah, I would think so. It is not from my college education but comes into play.

I1: Is it from your military experience?

P1: Some of it, sure.

I2: Can you give any examples from the military? Are they [inaudible 5:59] social responsibility, or, they probably didn't say "social responsibility" –

P1: Right, yeah. I would say like I was being socially responsible when I went in on a weekend to make sure that my parts were all complete so that everyone could be at the same spot when we started on Monday like for loadout or something. So, like, doing my part insured that everyone else is good to go too.

I2: Now, with your National Guard experience –

P1: I didn't do that. Sorry.

I2: Ok. Did you see that, beyond your duties within the military like serving the country or citizens or the public?

P1: So when I was serving in the military I did some volunteer work. It included picking up trash at a guy's house that just got dumped there by his delinquent son and he couldn't clean it up so, I guess that's how I just did that as a socially responsible person to help somebody who can't be helped.

I1: So, when you pursued this career in engineering, did social responsibility enter into it?

P1: Absolutely. So, I grew up in rural Indiana where people think they can do what they want on their land no matter what. You got guys burning tires and whatnot and "it's on my land so it's not a big deal" so I want, I mean, it's unfair to anyone downwind it's unfair to anyone downstream if you pollute the stream, so that is a huge of why I [inaudible 8:09] my major. Probably the biggest because I think I could probably make more money in [redacted: participant names a different engineering major than their own] but I chose not to do that.

I2: So it's just because you grew up in a rural area in which you saw all of that?

P1: [redacted: name of a base participant was stationed at], actually my Army experience probably made it more clear of just mismanagement of land and you have people putting in zero escapes so you have these huge runoff events with no storage of water so I think that's socially irresponsible.

I2: It could result in fire, flooding too.

P1: Yeah. It's just a very unstable area because of how they've chosen to things and that's even at the top level. You can't store water on your land, you can get fined for that because California owns the water so it's causing all kinds of issues, we send them tons of sediment down the Colorado river and nothing makes sense in that. I thought we probably need to do something about that with my career.

I1: Yeah you, Eric knows this but you get penalized if you have a rain barrel on your water spout.

I2: I do.

P1: Or if you have piling water after 24 hours after a rainfall, if it's visible water.

I1: Crazy.

P1: Yep.

I2: Does the financial aspect of engineering appeal to you when you made that decision as well?

P1: Well I looked, so I looked at – I knew I was making a conscious decision to make less money because I looked at [redacted: participant mentions an alternative engineering major] and I thought I'd be a great design engineer in the [redacted] field and looked and saw that I'd probably make \$30,000 a year less as an [redacted] side so financially, I mean, it was more social responsibility than financial. I knew as an engineer you'd always have a job, so.

I2: But since a lot of our students have completely different reasons, a lot of them have gravitated to what you said too.

I1: So, your subject matter is [redacted] –

P1: Yes.

I1: - so that includes prairies, wetlands, can you talk a little more about that? You know, and then, do you know this guy named Jackson in [redacted] who's dealing with perineal cranes [maybe "grains"] and stuff?

P1: Oh yeah yeah, the [redacted: mentioned specific institute working with the subject matter].

I1: You should connect with him.

P1: Yeah I've heard of him. I've heard a couple of speeches by him.

I1: Yeah, he's a big thinker.

P1: Yeah"

I1: And he's tried to do something about it.

P1: So do you want, did you want –

I1: Yeah, talk about the subject matter, your physical systems building things, you know, you were talking about these [redacted: refers to participant's major] before, so why don't you talk about that a little bit more.

P1: Yeah, so, lots of engineering involves structure because you have immediate benefits of it and society loves to see that, they want instant feedback and return. If you put in [redacted: refers to participant's major] correctly you'll have much better, for instance, infiltration of water, less drought because you have that water-holding capacity due to the soil structure's better, you have habitat for animals, and, just trying to think [inaudible 12:00], air quality could be improved because wetlands can help mitigate some pollution effects. Basically, yeah, instead of structure you want natural systems; better, enhanced natural systems I would say. Am I answering your question at all?

I1: So, instead of levees and dikes, you use the bayous and swamps of Louisiana -

P1: Mmhmm.

I1: - to filtrate the water.

P1: Yeah. And really that's too far gone at that point. As far as, yeah, you wanna have higher watershed controls so, like small headwater, dams, natural dams, and wetlands coming off of urban areas. You have constructed wetlands to kind of slow down the flow of water down the stream; have it so when it rains it doesn't have all, what's called "flashy", so all at once and then nothing later. Just to have a more uniform water cycle. In one of my research projects I came

across the US land base used to have 8% of it was beaver ponds. Now it's down to .0001% or something crazy. So we have no water storage anymore, of what we used to. And it's impossible to go back to that 8% but we could get higher than it is now.

I1: I mean, you've talked about the financial stability and prestige and potential to help people. So, you also mention that you didn't get this in college. You had your initial ideas if anything about engineering, has it changed at all during your three or four years here?

P1: Yeah, so I would say from college for sure I got perspective on social justice of it, so, like, for instance, lower income communities tend to have worse air pollution problems and worse water available for them.

I1: More flooding.

P1: No, it's like drinking water availability. The quality's lower just because people don't care as much, they don't have as much income from those areas. And obviously the industry is closer to that and the housing market's lower; like lower cost housing market because the industry's there.

I2: What about design work? Have you done any design work? Where you learn about design?

P1: Yeah I learned about design work. Just like, grassed waterways.

I2: That's kinda changed your view as well?

P1: Yeah because, so we went over a case study in Bangladesh looking at what to do as a hydrologist in the area and if you do something like put a fake dam in it takes out this land area, it's not fair to the people that live there and you have to account for all of this displacement and I'd say that this widened my view. I took a watershed management course we talked a lot about holding back water and I mean what that does to the local people [loud interruption 16:01]. I used to think that dams was one of the best solutions because they're very cheap, hydropower is very cheap but you use a huge land base for it and it displaces anyone who used to live there. So, definitely have a different perspective on those and what should be done.

I1: So were these more advanced courses –

P1: Mmhmm, yeah.

I1: – rather than... yeah. So at first you didn't get much.

P1: First two years I'd say, get very little to none.

I1: Are you allowed to take courses outside of the college of engineering?

P1: Yeah, so like a watershed management is not engineering.

I1: Oh it's not?

P1: Yeah, it's [inaudible 16:45].

I1: Was that a landscape architecture?

P1: I could take a landscape architecture one, this was in the ATM, what is that, I don't even know what it stands for. Automated Machine – it's the machining farm-management side.

I1: In engineering?

P1: Yeah yeah, but it's not engineering, or lesser. More like farm-management.

I1: Ok, ok. So, you've already talked about [inaudible 17:16] think about a course or two where you believe social responsibility was a part, one of them was watershed management.

P1: Watershed management is a, I mean, is a shining example. I think that most students should have to take it honestly.

I1: Yeah.

P1: Like, I know it's a tiny course, I mean, I had like 13 people in there but if it were moved to something I think it very much opens your eyes to social responsibility.

I2: Were there any courses or managing courses, any of your electives, did they go into this?

P1: Go into...

I2: Social responsibility.

I1: So is watershed management an elective?

P1: It was a technical elective.

I2: It's a technical elective so it... engineers can take it. I'm thinking non-engineering classes.

P1: So non-engineering courses that have gone into social responsibility.

I2: And engineering too.

P1: Yeah, and engineering. Let me think. Going through the list.

I2: I don't have a flow chart for you.

[Laughter]

P1: Yeah, that would be helpful. But no. Ah, let's see, I took BAE 231 course for example. I designed a different irrigation for the Kanza prairie. It was pretty simple stuff and didn't really teach me anything about social responsibility. SO that's like a design course. I guess BAE 445 which is principles of [inaudible 18:52] engineering.

I2: Which one is it? BAE...

P1: 445. That's a required course but it talked about using microbial activity to clean up oil spills and stuff like that. You can just add like fertilizer and let the biology take care of the problems. Or clean up with that too, low-cost solutions can be achieved.

I1: 101?

I2: He didn't take it.

P2: I transferred it. Soils was a good one. That's agronomy 305. It didn't hit on it much but if you wanted you could get it out of what we had with additional readings and case studies talking about if you management non-point source pollution on the Nebraska river the town of Omaha doesn't need to run their machine that costs \$1,000,000 a day. I can't remember [inaudible 20:05] but I know it was \$1,000,000 a day or something like that. Just based on if the correct pesticide and herbicide fertilizer applications are done they don't have to worry about that as much.

I1: So where did you learn about phosphorous and nitrogen water pollution, in any of your classes here?

P1: So watershed management, soils, I'm trying to think of anything else. Hydrology, which is a BAE course.

I1: Did hydrology, for example, talk specifically about social responsibility or did you have to weave that in?

P1: Yeah, so we did a case study on Bangladesh.

I1 That's where that was from.

P1: That's where that one was from, yeah. And, that was like, what do we do with this. And we just have test questions and part of it's on social responsibility, like, for instance, design this section of grassed waterway and should we put this in in this area? So it's definitely making you look at what the best perspective – getting perspective on what the best solution is using social responsibility, cost, feasibility.

I1: So would you say that's the one engineering course per se that really addressed it directly?

P1: Yeah, in engineering. Yeah, definitely.

I1: Who was the professor?

P1: Dr. Hutchinson.

I1: Do you know him?

I2: Yeah. She's a very good professor?

P1: And then, the watershed management course was taught by Dr. Rahmani. He does really well on getting perspective on issues.

I1: Is he part of the climate change group?

P1: Yeah, I think so. Well, now I'm not sure. I know he's had associate students there but isn't that [inaudible 22:14]?

I1: I thought the climate change group was like 15 universities...

P1: Oh dang well I don't know. I know I've been to a couple presentations back in 2016.

I1: I actually think...

P1: He definitely talked about... we talked about climate change for like two weeks.

I1: I think that group got a Nobel prize or some big prize, but it's a monstrous project, you know, to bring in all the big thinkers and K-State had a couple people on that team.

P1: That's interesting.

I1: That name sort of rings a...

I2: Those are great answers.

I1: Yeah, so two of the courses, watershed management and soil management, are outside of the college.

P1: Yeah.

I1: And one is in the college?

P1: Yeah.

I1: Any others in the college?

P1: I know there's a couple that I haven't taken that I probably won't be able to take like risk assessment is a good one, that's in the BAE... I don't know how much the green stormwater, green infrastructure is in that course, I don't know, I haven't heard anything on that and it's only offered every other year so, not very popular. I can't think of any other courses in the college that have made me look at that perspective like that. I guess another one, thermodynamics talked about it, it should be hit on more socially, just the temperature change in water after power plants use stream water and I learned more about what that does in watershed managements like two streams in biology and streams [inaudible 24:05]...

I1: Rather than in thermodynamics...

P1: Right, thermo, get on that, that does that so if you connect the courses, yeah.

I1: But if you connect it to water management it really dissected it a lot more thoroughly.

P1: Yeah, it had more, it gave life to like the biology part of it and what it does to trout in the Seattle area.

I1: So then the question is, and it's not on my list, or maybe it is, but do you have classmates, colleagues that share similar interests with you that you feed off of?

P1: I think I'm pretty unique actually. I can tell when we have presentations in a couple class with my immediate, so people in the environmental option of my major, we had some similar interest in watershed design and protection and stuff like that but I'm not sure that anyone passionately talks about nitrogen runoff and phosphorus infiltration rates, topsoil loss, but yeah, I don't even know, I think, my experience in the Army and just where I was locationally [inaudible 25:27] made my perspective on that stronger. Because people talk about climate change all the time and how terrible it is but I look more at the broken water cycle, nitrogen cycle, phosphorous cycle, and just the energy cycle, plants, I think those are more pressing issues than climate change as a whole and if you address those it might...

I1: So if you address the problems rather than the symptoms?

P1: Right.

I1: Have you faced any unique challenges being a Veteran student majoring in engineering that you think would separate out you from say the regular traditional students?

P1: Yeah, so, just the time between me... like chemistry I did terrible because, so, first of all in high school I was like "I'm not going to college" and so I didn't even have to take chemistry so I got thrown into it and I hadn't had all those basic stuff that people in high school had, those same chemistry courses into college they'd just get credit for them in high school or whatever so I would say I was behind on residual knowledge when I came in. And I still had enough time that my ACT score from high school was accepted but if I had taken it again it would have been...

I1: Much higher.

P1: Much lower.

I1: Oh it would have been lower.

P1: Oh yeah. I mean, you just don't have the knowledge to go off of. You lose it for more practical knowledge that you learn in the Army. I haven't felt like an outcast or anything in school; I look pretty young so that helps.

[Laughter]

I1: So like, I'm 85.

P1: I mean, another challenge, but it's not really related to any problems in school is just people's work ethic seems to be different in courses where when I go to, I mean my GPA is not high by any means, it's not even close to that, it's like 2.6 or something but I don't care about that. I know my fellow classmates will have A's in classes that I get B's or C's in but then when

we go to look back at stuff I know more than they... like their take-away from the course is nothing as far as I'm concerned and so that's just been frustrating.

I2: Why do you think that is?

P1: People are just going for the grade and dump the knowledge after that. They don't get the perspective from the course or anything like that, which is why lots of people think their college time is a waste.

I2: But do you think the military changed that a little bit?

P1: Yeah, because I can see how anything can be used, useful, I mean, it was really funny calculating distance from a shore line using a spotter-scope to get the [inaudible 29:05, possibly "two Million] and go from there to know how fast we were going so that was pretty...

I2: So you feel like you're getting a lot out of college?

P1: Oh yeah, I feel like every class I learn stuff in.

P2: I was in the same GPA range as you.

P1: Oh yeah. I've heard it's fine.

[laughter]

I1: My brother graduated with an engineering degree and you mentioned about your GPA about 2.7 and I said "how does that make you feel?" and he says "I don't care, I graduated".

I2: Yeah.

P1: Yeah, me too. But, I mean, if you take out -

I1: And he's quite successful.

P1: Oh yeah.

I1: You know.

P1: - but if you take out my first two years I'd have like a 3.3 so...

I1: But it's that transition time, getting back into the groove.

P1: Oh sure. And I think I can use that to my advantage and say that I'm at my peak of my learning ability as I left school.

I1: And they'll look at your last couple of years versus your first years.

P1: I hope so. I can at least talk about it if they chose to interview me so I'm not worried about job stuff I'm just worried about the location of it and what can open up, you know? My wife wants to be within 20 miles of family, like a job will open up 200 miles...

I1: After we're done I'll give you the name of someone I used to work with, she's retired now but, they had a whole network of water people from out of state including Purdue which is pretty close to where you are.

P1: Yeah, Purdue.

I1: Yeah, and stuff like that, but also Michigan State which wouldn't be that far, but they worked with some private people too [inaudible 30:51]. So other than losing that residual knowledge from high school that's really about the only major barrier you've experience as a Veteran or even as a... taking four years off?

P1: Mmhmm, yep, I'd say that that's fair to say.

I1: And you're going to complete your degree in about five years, four years?

P1: Yeah, in four. I mean, if you don't count the transfer I could have been right at four years but I missed a semester and that wasn't... so... four years at [redacted, participant's institution] I guess. I mean, I had to go through most of the classes anyway.

I1: What interventions would you recommend to address this challenge, you know, for example, what they're asking is challenges to Veterans. Do you belong to any of the Veteran groups on campus? So let's move on to that and rephrase that –

P1: Sure.

I1: - what interventions would you recommend that would bring more social responsibility into the classroom? Or what strategies?

P1: I would say... oh, that's tough. I'm trying to think of Freshman-year classes that I had to take just to kind of throw it in early. Like for physics, say, you could have a... ah I don't know if that's valid or not.

I1: Say it, who knows whether it's valid or not. Who cares.

P1: Right. So, for physics, you could have some sort of exercise on like a dam, like water pushing on a dam, you could make that into a physics thing. And then just try add social responsibility in that, maybe thrown in a video about a dam breaking, collapsing...

I2: So, sorry to interrupt you, it sounds like case studies resonate with you pretty well.

P1: Yeah, I really like case studies.

I2: And I know a lot of our engineering classes we don't do the best of that.

P1: Yeah, I mean I understand why they're not in there for sure but thermo for instance, I mean pretty much everyone has to take that.

I2: Yeah. Who did you take that with?

P1: Dr. Wanklin.

I2: Ok. He's a good professor.

P1: Oh yeah. So, if he threw in something about the temperature change and how that affects species biology that might help people realize that's an issue that needs to be thought about and all he brought up that I can specifically remember is regulation and you can't exceed a ten degree temperature range.

I2: Right. What about, and you have case students and you do group work and try to integrate that into a group project. Yeah you do the engineering part, what are the potential pros and cons of your outcome that could affect people downstream.

P1: Yeah, so if that was like... hmm... what class could that be...

I2: That could be a watershed class, any kind of engineering, fluid dynamics or fluid mechanics... like I've always wondered this when I took engineering classes I mean you do all this theory... what is the results of this theory and how bad engineering judgment can lead to loss of life.

P1: Yeah, so, I'm trying to think –

I2: Sorry to mess things up.

P1: No no, yeah so I haven't had good experiences with groups at all. I think, as a Veteran, I don't know if I just... I just have a different perspective and that changes how I do things but most of the time people for groups will want to meet together to slowly accomplish the same task, all four people, and I like having everyone does their own thing and then you defend your decision on what that is. So I do well on scrutinizing, which I think is from the Army. I mean, every decision I ever made was scrutinized so I think it's just a natural thing that happens. But I think you get a better perspective on that, if people defend their answer then you know where they're coming from and so you just have... the range of knowledge you can get by doing the same thing, or, by everyone doing their separate things is much better.

I2: I think it's an age, maturity thing.

P1: Oh for sure. Maturity more than age.

I1: How old are you?

P2: [redacted, participant's age]

I1: Such a youngster.

P1: Oh I know. Yeah, I spent lots of time breathing in the Army I think that was a helpful thing.

I1: Again, it's not on the list, but do you think being married has created a higher level of responsibility for you? Does your wife push you, support you, encourage you?

P1: I would say she doesn't... time we spend on things... what's helped with marriage is I work, my school work is an 8:00-5:00 job. I have no time outside of that that I can do... that's what I set as a constraint. And because of that I am hyper productive in the time I have in that span.

I1: That's interesting. That's the same way my son was in graduate school, he would go to work at 8:00 and get done at 5:00.

P1: Yep. And I think that has been the most helpful thing with marriage, just setting that constraint for myself that I'm not going to work outside of those times and that's just how it goes and I take just as many courses as anyone else and they always complain that they're working on stuff into the morning and I just think people are just not that effective at what they're doing. I would say that helps with... If you can convince people to do that in the school I think it would be helpful too. Maturity wise and you can say that in a job interview and they would say "oh great he's on it" because when people talk about their having to spend all kinds of time on it I just don't understand.

I1: But you make a good point. You make a good point, almost like time management.

P1: Mmhmm. Yeah I think that's one of the big things you should learn in school and people still suck at it.

I1: We talked about this; if the college were to better integrate social responsibility into its curriculum and programming what resources or interventions or strategies would you recommend?

P1: Yeah, case studies would be good. And just... yeah... the impacts of your design I think would be helpful.

I1: Both primary and secondary and tertiary impacts.

P1: Yeah. Like in my hydrology class we have like I said before we have "design this; should it be done?". "Can it be done?" first, "should it be done?" second and so the test questions is two-thirds design work and then one-third explaining why or why not we shouldn't do what it is asking.

I1: So the "should" is the impact part?

P1: Yeah, so like St. Mary's, we had to design if St. Mary's should have a wastewater irrigation system or what plants would just take up the wastewater and so we went off of it worked design-wise but should it be done? You have to deal with all of the contaminated plants and if there was a large rainfall then all that water would run off anyway so it shouldn't be done because of those factors and that's like the social responsibility thing. It would work physically it just shouldn't be done.

I1: Excellent. Do you have anything else?

I2: I don't think so.

I1: Do you have anything else you want to add?

P1: No I'm still just think about those entry-level courses and what you can do...

I2: Would guest speakers help? Or is that kind of ineffective?

P1: I had guest speakers in management but we want to see how to add this into the freshman and sophomore year classes. There's not much room for that.

I1: Do you think the professor makes a difference? How they present the assignments and stuff?

P1: Yeah. Mmhm. So yeah, like fluid dynamics we could go over the... so we talked about water, the power of water per se, we could show water emptying from something and taking out soil in its path or something just to get an introduction to that for the [inaudible 42:00] too. If you could somehow relate the impacts of this engineering decision to the course that would be...

I2: It's more of the soft side of engineering.

P1: Right.

I2: That was great.

### **End of focus group proper**

I1: Well [name redacted] I really enjoyed this. You're really a sharp young man.

P1: Try to be!

I1: So your goal is not to become a professor?

P2: No.

[laughter]

I1: You fail!

I2: I know. He's not Civil.

I1: You mean he's not polite enough. You mean that by "civil".

I1: I'll give you my card. I'm going to turn this off and I really appreciate you and Eric I appreciate your comments too. Let's see if I can do this right –

### **End recording**