**Waste Collection Company Interview Questions:**

* **When is each fraction collected? What system is used to determine which areas are collected when?**
  + It depends, the schedule of the recyclables is produced by the municipality. However, sometimes the schedule can be modified because a large problem they face is space. More specifically, the volume that each fraction takes up and if there is enough space for this. As a general schedule, apartments are collected more frequently than the private owned houses since they make more.
* **Can you provide us with route maps for your current collection? How were the routes set up and modified throughout time?**
  + Maps are used infrequently, usually in time of change or low frequency. Routes were changed over time to account for error or missed bins. For instance to cover two regions that are far apart from one another, the routes will switch back and forth so that any missed, or emergency pick up, bins can be retrieved within two days and not multiple days. Additionally, factors such as holidays need to be taken into account. Since the company does not know the weight of all the bins, if the truck becomes full and must drop the waste off, it will not go back out on the route to collect a small number of bins. Those bins will be postponed until the next day or two.
* **When planning routes, what factors affect your planning software? Do you take into account parameters such as traffic, truck compartment limitations, and seasonal variations?**
  + Since programs do not recognize walls, sharp turns, or the fact that trucks back into one-way streets a lot, the majority of route planning in manual. Some factors include seasonal variations (patterns are reworked every 8 weeks to account for hot summer heat etc.), red routes and allowed hours of operation, crossing large roads (bins cannot cross large roads), street weight limits, one way restrictions, and the potential to cluster areas. There are some roads that must be collected before 7, because if not they pose too much danger to drivers, cyclists, and garbage men. For instance, narrow two way roads where a garbage truck is blocking two way traffic as well as cyclists.
* **What labor laws did you pay particular attention to when planning routes?**
  + Every contract is different set forth by the municipality. When bidding the contract, City Container must include the stipulations that come along with the contract, in their route plans. The labor union does have a limit on the amount of bins that the garbage men can collect but that will change due to the increased recycling goals.
* **Can you explain the management of shifts and when each route is allowed to begin?**
  + Ideally, the garbage men would go fast enough to allow two shifts in the day. The shifts to collect residual waste must work around the hours of the incineration. For instance, if ARC accepts trucks until 16.00h, then they must tell them if they will be late etc. Restrictions of patterns/routes depend on the start time of the vehicle. For instance, many places are not allowed to start until 7 due to the sound. Shifts are managed in teams as well. Seven men per truck to know each route as well as when to empty the truck and who goes where.
* **Do you track the trucks via their tracking devices throughout the day? How do you use this information?**
  + Yes, operations can view routes and activities of the trucks. However, this is not commonly used unless there are customer complaints where many bins were missed, collecting too early, or a damage report. Operations can also see the speed and breaking patterns of the truck.
* **Why are GPS navigation systems not used in your collection routes?**
  + GPS systems do not account for traffic, and will reroute often since street are so close to each other in the city. GPS systems need better satellites because many times they lose signal between buildings or do not lead the truck to the correct address.
* **What system is used to communicate between company and customer? How are difficulties with collection managed?** 
  + When a bin is not collected due to obstructions, a picture and short blurb is sent to City Container. Employees in the office then put this information in the municipality’s software, called ASK. It is then the company's responsibility to tell the driver to go back or not. However, the administration at City Container does not like this system, it is not user friendly and not focused on production. Ideally, the company would use a system that notified the customer when the truck will be there but they must use ASK.
* **What is used to power the truck attachments such as compactor/lift? Do you have any data on how much power is used for the attachments on each truck? If electric powered, what charging methods are used for the attachments on your waste vehicle?**
  + The compactor/lift is called an EPTO (20-40 kw) which operates on battery while the engine is running. Currently, the battery can only supply the lift with about 1.5 shifts before it is powered by biogas. One kilometer of driving takes 1.5 kilowatts. The motor is not turned off since it takes 1-2 minutes to get going. However, the battery must only be used to 70% of its capacity (so down to 30%) or else the battery will be damaged and need to be replaced. Hopefully, the next generation of truck will be solely electric truck so the battery can be larger since there does not need to be one battery and one motor.
  + For charging, there are multiple chargers. Using a 20 kilowatt charger, it takes 15 hours to fully charge the truck, while a 50 kilowatt charger takes only 5-6 hours. The truck needs to take 1-2 hours to cool down before charging. However, if needed the system can be ‘shocked’ and charged before the cooling period. For a full electric truck, it is estimated that it will take 7-8 hours to recharge for a 50 kilowatt charger and are estimated to be 310 kilowatts.
  + Drive about 60-80 kilometers.
* **What are some issues that you encounter in waste collection? What are some areas that you believe could be improved in the waste collection process?**
  + They believe that the bins can be improved for instance, a butterfly cover that opens in the middle of the bin instead of opening on one side. Many bins are split to incorporate two fractions which can be changed. For instance, plastic cannot be split since it gets pushed into the bin and it is hard to empty after that. Metal and textile could be combined. Additionally, each municipality tends to collect waste their own way. To make a uniform system could help especially sorting - there would be less contamination.
* **What are your procedures for instructing a new driver and train them on a different route?**
  + The procedure starts with an instruction system that described how to do everything. Next, a mentoring system comes into play when a dedicated mentor spends 1-3 weeks helping the new driver understand the culture and rules. Lastly, sideman training where they do it themselves, alongside a more experienced worker.
* **What system is used to determine which areas are collected when?**
  + The addresses are entered into Excel and a geocoding program, Mapline is used to make a preliminary map. Employees must know the district extremely well and this map is gone over with them. The purpose is to make the routes reliable to make the system the most efficient and safe. They try to keep the same employees working with the same people as much as possible - for instance only one person (in the pair of two) can go on vacation at once. The changing of routes and people is when mistakes are made and the system is changed again. For instance, one employee might be okay with stairs but another might not be.
* **What is the maximum weight that trucks can hold?**
  + Between 5-11 tons depending on the type of waste. Food is very heavy, but plastic is not. There are two types of trucks, a 2 axle and a 3 axle. The 2 axle can hold 8-10 cubic meters of waste (5-6 tons) while the 3 axle can hold 11-12 cubic meters (10-11 tons). Not including the 1 cubic meter and 1 ton for the battery of the EPTO.

**Additional Notes:**

1. The best way to make a route is the garbage man since there are one ways or cars in the way (must back in) so need someone who knows the district very well
   1. Cannot find system that knows all of this
   2. Okay to put lights on truck and go down one ways
2. Make routes, go out for week, come back, then discuss and change roads a little bit 2-5% routes change after a week to optimize
3. Want to be called waste man (10 years employed, renovation man until then)
4. GPS on every truck, can tell each Mon/Tues traffic changes
   1. Tell which fractions
5. Do not need seatbelt during collecting but going to incinerator must be worn
6. All trucks have straight floor so they can get out either side depending on traffic or lack of space
   1. Mercedes and Scania make this truck
7. When bins are not collected due to difficulties, bins are collected later the same day but if not then go the next day until it is collected
   1. If one story house, do it next time
   2. If apartment building, do it next day since waste will build up