CAMBRIDGE COMPANIES
Design-Build Solutions

TRANSFER STATION DESIGN CONSIDERATIONS

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The design of a transfer station can be affected by many factors, among them are:

- Operational permit from the permitting authority
- Site Location, Size and Layout, including your neighbors and general grade of the land
- Throughput requirements both short- and long-term, including material types and separation required
- Owner's operational preferences

OPERATIONAL PERMIT

The operating permit often dictates design features of the building. As you work through the process of obtaining your permit, often times you need to make concessions to the permitting authority in order to get the permit approved. Many times this depends on your relationship with the authority and your history of operating transfer stations within the state. The operating hours of the facility, the materials you will be accepting and the neighbors within +/- 1,000 feet of the facility itself all affect the operating permit requirements. It's not uncommon during the process of applying for and obtaining your permit that the authority ask for you to include certain features within your building. Sometimes you can push back and not be required to include them all, but a lot of times the owner agrees to make these concessions in order to get their approval. There have been cases where the owner was required to install doors, bird control systems, and negative air systems. Other times, the authority will also require the site to be designed in a way that all overhead doors must face certain directions, or for there to be a minimum amount of queuing on site to avoid traffic congestion on the adjacent roads. They may also request certain aesthetic factor on the outside of the building such as pre-cast panels, masonry, undulations in the façade, color schemes, etc. There really is no "standard" requirement as each state and municipality is different and most of it depends on your neighbors, zoning requirements, past history of operations and your negotiation skills. This is just the tip of the iceberg when it comes to the operational permit and zoning regulations. It's important that your design/build firm works closely with your permitting consultant to ensure they have covered all their bases and included all the required items.

Figure 1 - Overhead Doors

SITE LOCATION, SIZE, AND LAYOUT

The site plays a major role in the design of the facility itself, how your operations will function and the overall cost of construction for the new facility. In urban areas, you will have certain zoning requirement that will affect the overall design and layout of the facility in addition to the site requirements. These factors will likely increase the cost of the construction versus a more rural site with limited zoning requirements. Also, depending on the access to the facility, you may be limited to one entry/exit point or you may have two, depending on the site. In most cases, you are required to weigh all inbound vehicles to track their weight and charge accordingly as well as weigh all outbound transfer trailers. In some cases, you also must weigh certain 3rd party customers that don't have stored weights in your system. This requires you to ensure the entry and exit points are closely monitored so you aren't losing revenue. You can do this through a house attendant or through cameras and an intercom system. These options would depend on how you want to operate your site. The important factor here is that,

you want to limit access points to the site to limit your risk of having customers leave without paying or getting their certified weight tickets for transfer vehicles (if they are required).

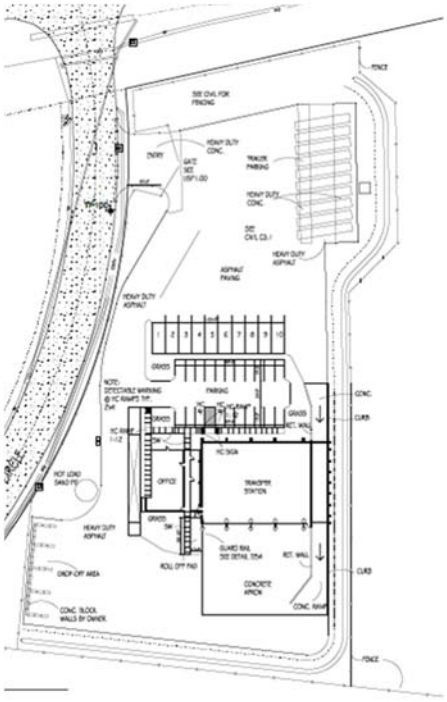

Figure 2 – Facility & Site Drawing

The distance to the landfill also plays a role in the site design because it affects what hours you operate your transfer station because you want to ensure that you can get the necessary loads from the transfer station to the landfill every day. This can affect your operations as it will play a role in the decision between live loading or not. As part of your preparation for submitting for your operational permit, and before starting the design process, you will want to fully evaluate your operational plan for your facility.

When it comes to property size and grade, it's important during property evaluation to ensure you have enough room on site to properly layout your facility to accommodate safe and efficient operations. You want your internal vehicles and third party customers to be able to get on and off the property quickly so that you can maximize your volume as well as keep them happy and your costs down. Sometimes you need to store transfer trailers on site and other times you want to park some of your route trucks there. There really is no good "rule of thumb" on size of site required for a transfer station because many factors play into the size that each individual operation requires. You would want to work with an experienced firm to help you ask the right questions and develop the need you have in order to properly evaluate various sites to help you choose the one that best suits your operational needs and is the most cost effective to construct on.

The grade on site plays an important role because, if the site is sloping, you want to use this to your advantage by locating the pit on that side of the building in order to limit the excavation required on site. If the site slopes the wrong way, construction cost could become cost prohibitive. It's also a big factor in the site design in terms of storm water. You want to locate any required detention on the low side of the site. Grade can dictate a building layout that restricts your operations, building size, detention areas and site lines for neighbors. This is definitely a factor that needs to be paid attention to during the selection process.

Figure 3 - Aerial View of Transfer Station & Site

The last factor we will touch on with the site is the neighbors. As everyone already knows, the "Not In My Back Yard" or N.I.M.B.Y. factor is alive and well. Because of this, many landfills, transfer stations, recycling facilities and even hauling companies are being forced outside of urban areas to more desolate locations. Due to the nature of transfer stations and what they process, it's no surprise that no one wants them for a neighbor. You will be required to modify your design to limit disruptions to your neighbors and to limit nuisance factors like vectors, smells, excessive noise, traffic and litter. This is compounded with operation of the transfer station between the hours of 10:00 pm and 6:00 am. The noise of starting trucks, idling trucks, back-up beepers, dumping trash and loading transfer trailers can travel quite the distance. You will want to design the facility so that the travel of these

noises are limited. Another good idea is to incorporate bird controls and odor control systems from the onset of the facility. If you can open the facility with limited complaints, it should help your long-term operations. It's best to be proactive with your neighbors as opposed to reactive. The last thing you can do, if you do happen to have some residential neighbors close by, is to ensure you are limiting light pollution from your site by making sure all your lights are mostly spraying downward.

THROUGHPUT REQUIREMENTS

The actual material you will be processing drastically affects the layout, size and shape of your transfer station. If you are just handling MSW, it makes the design a lot simpler than if you are separating out and receiving other materials within this same structure. Many transfer stations also take white goods, cardboard, shingles, batteries, recyclables, organics and other materials that are typically diverted from the landfills. In order to accommodate the entire stream on one site, you need to designate areas for collection of each item. Some of them can be located on the site in a specific area built out of concrete "bin blocks", others are required to be stored within a structure which can be free-standing or a "sea can" and others must be stored within the transfer station building itself. A lot of these decisions are made during the permitting process and then must be factored into the design.

Figure 4- Exterior Drive-Thru Pit

It's important that the owner really understands and has a good handle on the throughput requirements for the various commodities and MSW that will be handled. As well as the items collected, the methods used to sort and remove them from the waste stream and the amount of area they will need to store them. White goods take up a fair amount of real estate if you accept a lot of them, as do shingles and organics. If they want to remove cardboard or take clean loads, this must be kept completely separate from the MSW in order to maintain its value. Same goes for recyclables. All these incoming streams need space on the site for storage and unloading. Typically, none of the other material streams can mix with MSW. If it mixes with MSW, it must go to the landfill in most states. You don't want to cross-contaminate your waste streams.

The actual throughput of the main material (typically MSW) will determine your preferred building layout. High volume (more than 120 Tons Per Hour (TPH)) transfer stations typically have more than one loading station and either use a push pit or an excavator to load their transfer trailers. Medium volume (less than 80-120 TPH) transfer stations typically can move their volume through one pit using a push pit with a loader and tamping machine or a lift-and-load operation (partial pit) and large loader. Smaller volume (less than 80 TPH) use one pit with a lift-and-load operation or, if the site permits, can also utilize a push pit with a loader and tamping machine. We don't typically recommend compactor set ups due to the upfront capital required and costly

Figure 5 - Interior Pit View

maintenance of the machines unless you are allowed to truck unlimited weights or are loading rail cans. Compactors have their place in certain types of facilities.

It's very important to factor in future growth as part of the facility design. You don't want to design a transfer station that is only big enough to handle the volume for the next 5 years with no consideration of future needs. You want to design a facility that can handle your growth for the next 20+ years. There are means and methods to design a transfer station that is expandable to handle growth as you need it. Don't short change yourself, you will regret it immensely when you have trash spilling out the front doors of your building and you are getting NOV's. An experienced firm can help you develop these options for consideration during the design process.

OWNER'S OPERATIONAL PREFERENCES

Figure 6 - Scales and Scale House

Every owner has a way they like to operate a transfer station and their preferences must be taken into account when designing the facility. Some owners prefer push pits while others prefer lift-and-load (partial pits). Some like using excavators while some like using loaders. Some only want drive-thru pits while others don't have a preference between drive-thru or back-in as long as they can get their loads out every day. The owner needs to make sure they have built the right team for the project so that important decisions can be made quickly while designing the facility. The team members should consist of the operational personnel who will be managing the day-to-day operations, the equipment specialist, the safety specialist and the environmental manager who is working on the permitting. Sometimes it helps to also bring in some of the third party partners like the transfer trailer hauler or an operator if you are contracting that out. There are many operational decisions to be made during the design process and you want to make the right decisions because transfer stations are typically made of heavy duty concrete, so making changes after construction is costly.

NEW TECHNIQUES IN OPERATING A TRANSFER STATION

The way transfer stations are designed and operated have changed a little over years. With the growing push for landfill diversion and the ever changing and evolving ton of waste, it is sure to continue to change fairly quickly over the next 10-15 years. We are likely to see more separation of organics from the waste stream as well as an increase in the number of municipalities that participate in recycling. Waste companies will likely want to try and get as much clean commodities as they can which would mean they are convincing customers to source separate cardboards, office paper and other materials that do well on the commodity market. Some operations may try to do more on-site separation if the commodity markets provide an attractive return on their investment.

Along with these items, the growing push for waste-to-energy plants is leading the industry in a whole new direction. The technology is improving, which is leading large volume municipalities to take a hard look at these technologies as it could mean 100% diversion from landfills, if they can send all their material to a firm that can process the materials in a dirty MRF and then send it to a plant that could manufacture bio fuels or pellets for burning.

Once this technology becomes more cost-effective and is proven to work on a large scale there will be more of them in the United States, much like Europe. This will affect the destination of the waste more than transfer station design, but it may modify the operations of the facility.

CONCLUSION

In closing, the design of a transfer station to meet your current and future needs is very important because a transfer station is one of the best ways for you to manage your operational costs which helps you stay competitive in your local market. You need to make sure that you factor in all the items that have been mentioned here as well as many others which haven't been discussed yet. The changing environment for the waste industry will play a role in how the waste is processed and its final destination, so you need to make sure you stay in touch with the ever changing marketplace. It's important that you find the right partner to help you permit, design and construct your new transfer station. A partner that has been through the process and knows the right questions to ask and that understands the waste industry.

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