Planning and Implementing a Facility Expansion

A high-level look at a step-by-step process to improve, update or expand existing MRF facilities.

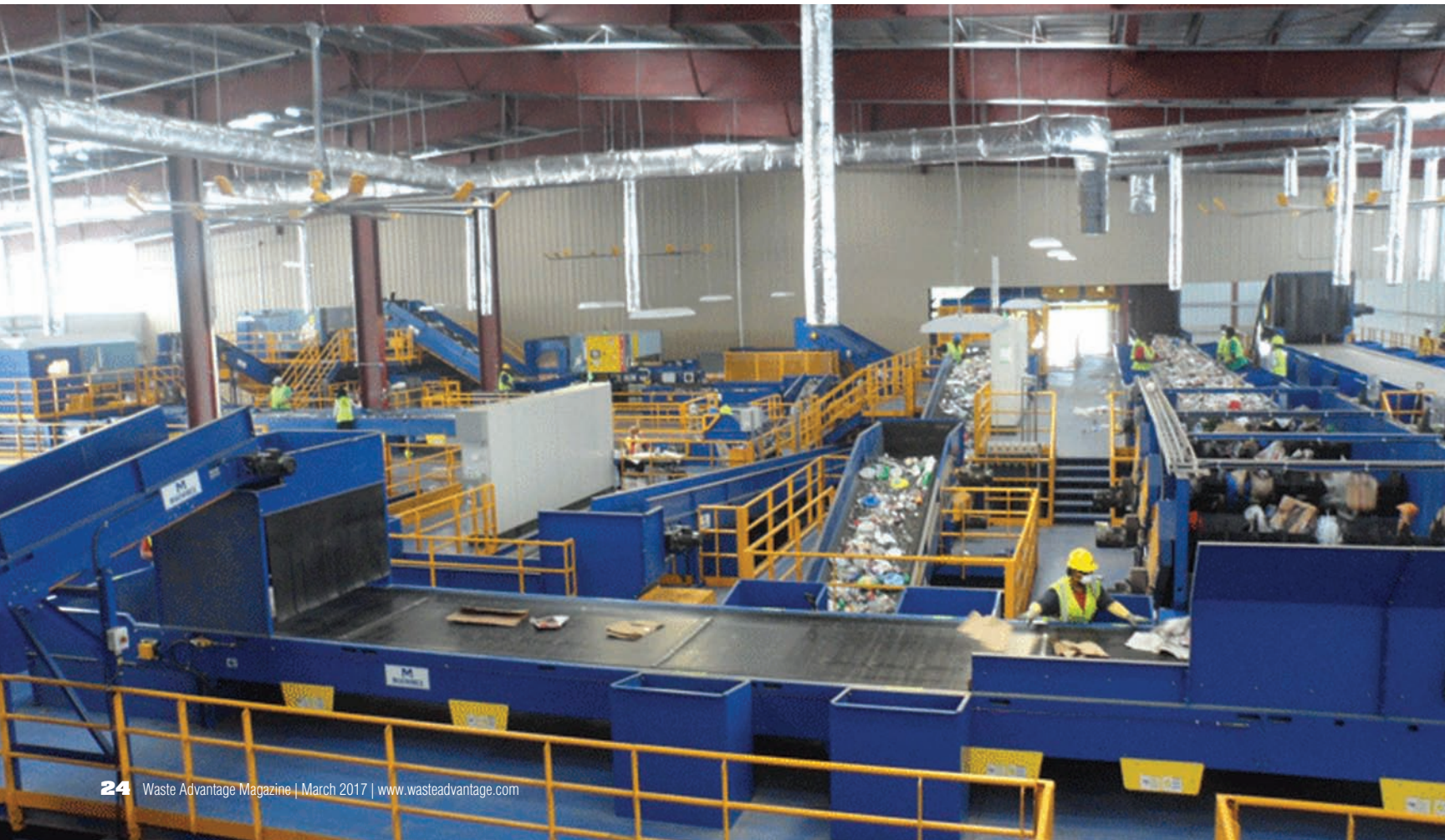
By Evan Williams

Recycling is a dynamic industry with constantly changing priorities and best practices. Owners and operators of recycling facilities are faced with a landscape that requires adaptability and flexibility to ensure that their operations and services meet the needs and expectations of their clients now and into the future. In order to adapt to these changes, companies and municipalities look to make changes or upgrades to their existing recycling facilities; however, they face tough economic conditions with limited return on investment (ROI) available to them. Changes must make good financial sense in order to be approved by the ones funding them. It is imperative for all parties involved to efficiently plan these modifications and work through the process of implementing these changes as expeditiously as possible in order to help manage the costs. The added complication of reduced commodity prices requires that all changes be cost effective. There are several ways to meet this goal; planning and coordinating, by incorporating all the project team members, is critical to achieving a quality end product that fulfills the project objectives and provides sufficient ROI to be approved.

Assembling the Team

The first step is assembling the project team. A good approach is to include all the project stakeholders to outline and define the need(s) and other project goals. By including the project owners, the community, facility owners, equipment suppliers, project designers and the construction team, all input will be received on the front end. This will ensure that needs will be best understood and the solutions will address them. An added benefit of including the equipment, design and construction teams in this process from the onset is that

Recycling equipment. Images courtesy of Cambridge Companies.



they will be able to add their experience and help direct the solution toward feasible approaches that are realistic and within the scope and budget of the project.

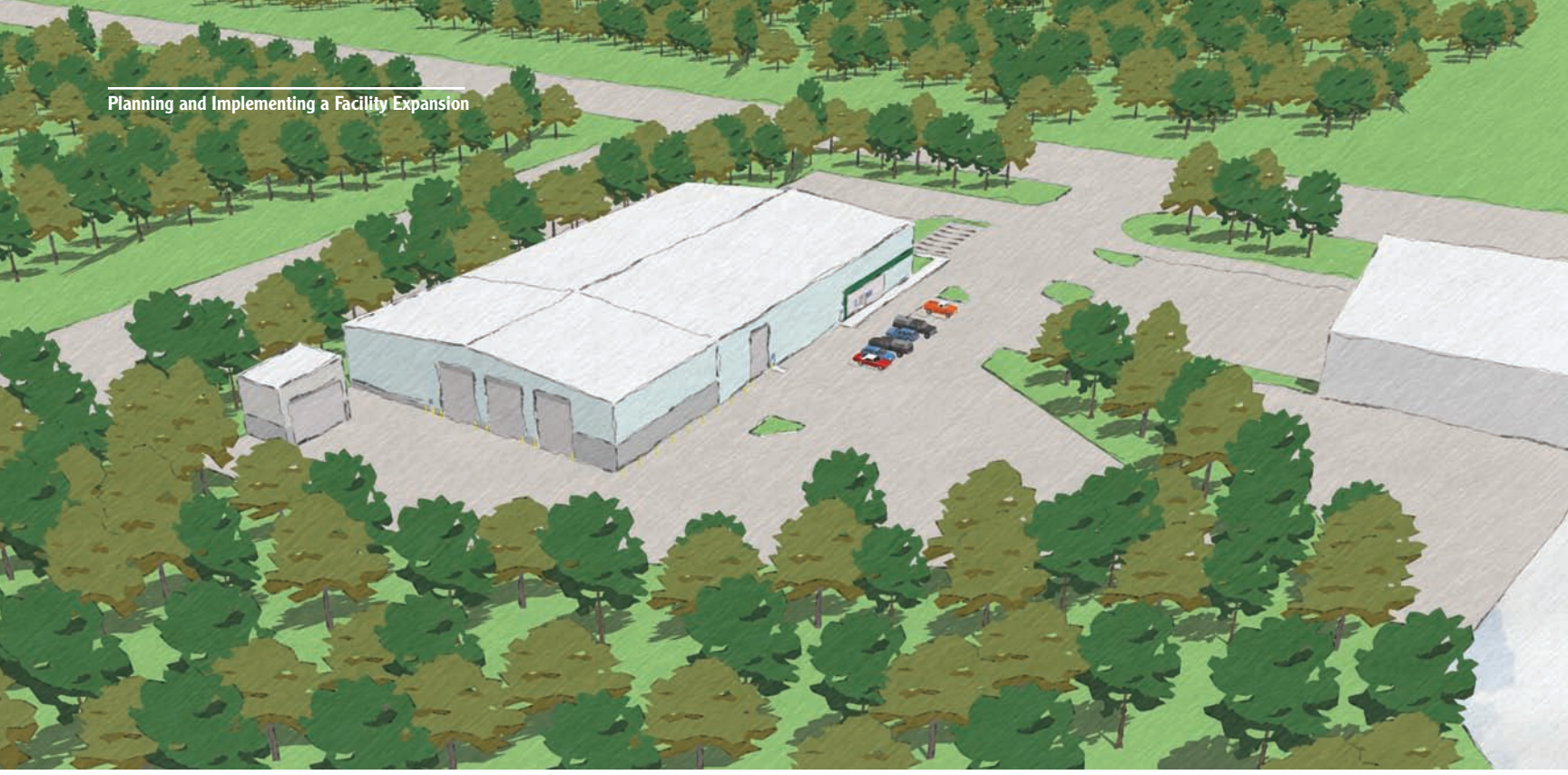
Existing Facility Evaluation

The second step of a facility upgrade and modernization process is to conduct a wholesale evaluation of the existing facility. Most facilities are a collection of different equipment pieces and systems that have been assembled over the years. This is a testament to the ever-changing nature of the recycling market. This equipment should be evaluated, as some portions will likely need to be removed completely and certain parts may be re-used in the new system. Some of this may need to be re-built, and that work and the time for that work should be factored into the procurement timeline. In addition to the equipment evaluation, a detailed evaluation should be made of the existing building as well as the facility site as a whole. The existing facility should be drawn and surveyed as well as the site—this information will be used by the engineers as they develop their improvement plans in the next phases. In addition, this will assist the team obtain a better understanding of the building and site's shortcomings. These should be documented in a report to the owner, as existing building and site issues should be addressed as a part of the facility upgrades.

Running concurrent with step two, a recycling stream analysis should be conducted. This would help the team understand the incoming material stream, to design the new system to best process this. The analysis may also identify opportunities for the community to increase diversion, either through greater access to toters or through increased education. This analysis will help inform the project team to ensure that their efforts are in alignment with the needs of the community.

Equipment Design

With the project needs and goals defined and the existing facility well documented, the third step allows the team to focus on the best means and methods to satisfy the project program. The equipment vendor drives this step. They will work with the owner and the design team to formulate a new equipment plan for the facility to meet the project parameters. These include the expected processing tonnage per hour, diversion quality/quantity, required/expected staffing levels, amount of new versus reused equipment, available space for the new system, available height in the facility and budget for the new system. There will be significant time at this step spent between the end user and the equipment vendor on designing a system that works for them. A clear understanding of how the system will be laid out, as well as how it will be staffed will assist on getting buy-in on the final plan. Another critical focus at this point is making major project decisions like the number of balers and whether to use optical sorting or in-feed balers. These all have significant impacts on the system layout and cost. Adding or changing these later in the process can significantly impact the project schedule and budget. As the equipment vendor is working through their layout, they are coordinating this with the project design team to evaluate the best ways for this to work in the existing facility. Where possible, it is



3D Rendering of planned facility expansion at the SOCCRA MRF in Troy, MI.

best to make as few building modifications as possible to minimize downtime, but some buildings are too small or short for this. In those instances, additions will be needed to provide the additional footprint, or structural modifications will add the required height. While additions do present cost implications, they can reduce their impacts on the project cost significantly if they can be constructed while operations are ongoing and prior to system shutdown. This may allow system downtime to be decreased significantly, making a cost-prohibitive addition be a project cost savings when evaluated against extensive building modifications that occur post-closure. The goal at the end of this step is an equipment plan that meets the project goals and has buy-in from all the stakeholders.

Building Design

Once the equipment footprint and the system layout are finalized, step four allows the design team to start an operational layout of the facility. This will take the equipment layout from the vendor and start to overlay all the facility needs as well as the existing facilities. This will result in a clear plan for what building additions and modifications are needed. At the front of the facility, the team will evaluate whether sufficient tipping floor space is provided to receive the material, as well as whether is provides enough unloading positions. If either of these are insufficient, a tipping floor addition may be needed. The added tipping floor will allow the facility to receive more material quicker, reducing idling time and queuing time at the scales. In the processing area, the team will evaluate the area around the equipment. There will need to be enough room to access all the equipment for service, as well as accessing the sorting bunkers and providing area for direct feeding of the balers. There may need to be additions, portions where an existing building roof is raised or overhead doors added to accommodate the equipment. In the bale area, sufficient area needs to be provided in the run-out area at the balers as well as sufficient bale storage. The required bale storage area, as well as the number of loading docks will vary based on the materials the facility receives, the volume of that material and the shipping logistics of your area. Once the structural modifications are defined, mechanical upgrades should be evaluated. The existing and new additions should get a new lighting layout, where possible. Long-life LED fixtures (100,000 hours) should be considered as they have reduced service needs, as well as higher output (27.000 lumens), which provide high levels of illumination, while minimizing the need to get above the equipment to change bulbs or ballasts. On the electric service side, evaluate whether the existing electric service will be sufficient for the new system. Between optics power needs (including process air), as well as multiple balers and screens, retrofitted recycling systems may draw significantly more power than the old system. If that is the case, start the process for the new service as early as possible. Electric utilities are notoriously slow with larger power services. An additional consideration is to provide extra power to accommodate future expansion of the system. At this point, the system starts to resemble a complete system, but there are several more critical stages to realizing a final product.

Evaluation

This next stage is evaluation. At this point, the end user and the community stakeholders will review what the equipment and design teams have produced. This will produce meaningful feedback that will be incorporated into the final design. Running concurrent with an owner/community review will be a review by the construction team. They should be involved with all the stages of the project, providing input and guidance on best approaches from a schedule, budget and practicality standpoint. However, at this point they will provide a detailed analysis of the project design and prepare project budgets and schedules. This is absolutely critical, as this work will

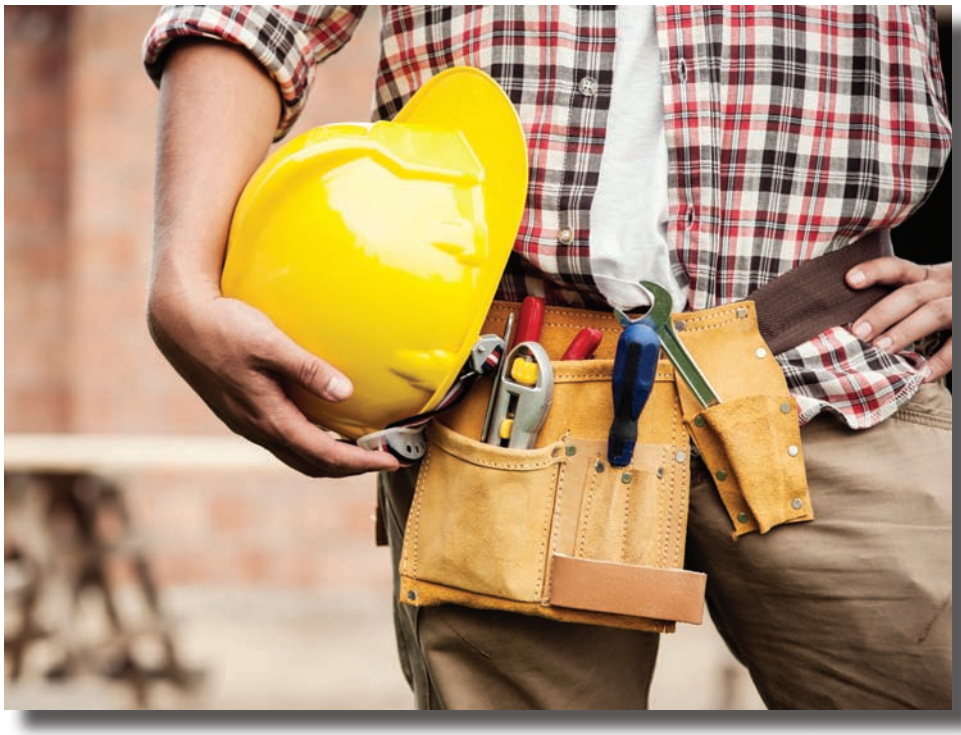
allow the project team to confirm whether the project tracks to the budget. To complete a step five (evaluation), the entire project team needs to meet to go over the project status. The feedback from the owner/community review should be discussed, as well as the results of the construction cost review. In addition, the recycling equipment vendor should have final costs put together at this point. All these pieces should be compiled to present a project status. That status should identify a project that meets the projects needs/goals and is within budget. If any programmatic needs are not being addressed or the project is over budget, changes need to be made to resolve that disconnect. Any changes to resolve any programmatic or budget issues should be fully discussed and understood by all parties.

Implementation

The final step is implementation. At this point, both the recycling equipment system and the building modification plans should be finalized and approved. As the design teams work to complete the technical and fabrication designs, the construction team will work on their construction schedules in coordination with the fabrication and installation schedules from the equipment vendor. By performing these activities concurrently, time is used more efficiently and the opportunity for meaningful feedback is increased. Weekly meetings of the procurement team will help track critical items and ensure accountability. The task of construction coordination and equipment installation is a subject for an article all to its own; however, in the context of this article, there are important facets of this process that come into play. One important consideration is scheduling the construction work to start as soon as possible after the system stops. Once the system is shut down, all the equipment removal and building modifications should start. Where possible, have the equipment and building work progress on parallel concurrent schedules. There will need to be daily coordination between the construction and equipment field staff to ensure that the equipment vendor can work unabated by the construction work.

Startup

As the construction and equipment installation work is nearing completion, startup testing and staff training are critical to ensure a smooth system startup. This portion will rely on the owner/operator and the equipment vendor to work through the equipment system(s) and start training key personnel. It is advisable to hire an independent third party to perform a system QC analysis to ensure that the system is meeting its performance metrics and being operated properly. Since the QC/QA vendor is a third party, they can be independent in their analysis and recommendations on how best to resolve any system issues that come up between system design, installation and operation. While the startup work is ongoing, the building construction team needs to be involved to finish building punch list work, as well as



Construction improvement, upgrades or expansion underway.

make any required building compliance items that always come up. These often include additional under-equipment lighting, safety floor striping, convenience outlets, protective bollards and railings, and any other operational or safety items that come up once the equipment installation is complete and operation of the facility begins. There is often a three to four week overlay from when system startup begins until final formal hand-over of the facility.

Conclusion

Every recycling facility is different, and this makes the solutions to their various operational and performance needs a response to each unique situation. Keeping the owner and the community involved ensures the programmatic and operational needs will be known and met. When the equipment vendor is a core team member, they are able to shape the equipment and building as a direct response to the needs of the owner and the community. When the design and construction teams are involved from the start, they better understand the project needs and parameters to best address those requirements. An added benefit to the early involvement of a construction team is that they can provide ongoing budget analysis and feedback to better keep the construction budget in line with the project funding. By involving all the stakeholders in a coordinated, deliberate and collaborative process, the final product has the best opportunity to reflect and address the needs of that unique case. | WA

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