The City of Cape Girardeau Solid Waste Transfer Station
A Model of Creativity, Cooperation, and Commitment

Name of Entrant Organization:
Cambridge Companies, Inc.

Project: City of Cape Girardeau Transfer Station
Jurisdiction: City
Approx. Population: 38,816
Cost/Household for project: $100
Approx. Budget: $3,893,459

Contact:
Jeffrey Eriks
Chief Business Development Officer
Cambridge Companies, Inc.
500 E. Ridge Road, Suite 202
Griffith, IN 46319
Phone: (219) 313-0813
Email: JeffEriks@CambridgeCoInc.com
The City of Cape Girardeau Corporate Circle Solid Waste Transfer Station (SWTS) is a very unique project. The project required a successful partnership between a large private solid waste company, private design engineering firm, and the municipal government. The project had very unique challenges including limited space and funding, short time-frame (due to an obligation to the State Department of Natural Resources), recurring natural calamities, and State restrictions for design/build projects. The City set specific goals including easier access to the SWTS for the community, expanded recycling, improved efficiency and customer service, and increased tonnage.

Although challenged at many points, The City, Republic Services (Republic), and Cambridge Companies (Cambridge) used creativity, cooperation, and commitment to complete a stellar design/build project to serve the residents of Cape Girardeau, MO and the surrounding area for many years.

Executive Summary
Project Planning

Site and Facility History

In the mid-1970s, The City took over collection of residential and commercial solid waste. Prior to that time, waste collection had been handled by private contractors. The City’s Petroleum Road SWTS was originally built in 1989, located off South Sprigg Street in an area of heavy industrial use and adjacent to a large quarry operation. In the mid 1990’s, commercial customer services were transitioned to independent contractors. The City no longer handled this type of solid waste collection.

Residential solid waste collection continued to be handled directly through The City’s Petroleum Road SWTS. This facility consisted of a metal building with one large opening, no distinct bays, a 2,028 sq ft tipping floor area, limited circulation space for vehicles, and required a separate space for white goods/appliances. Other challenges included not having space for two refuse vehicles and one smaller vehicle to maneuver inside the existing facility concurrently. Costs for maintenance and upkeep were increasing each year with a growing volume of solid waste demanding more space. In 2007 and 2008 a significant geological event occurred that required The City to make a decision regarding building a new SWTS or using one in a nearby community, which would have been inefficient. The geological event was the dramatic occurrence of 20 major sinkholes within a few miles from the Petroleum Road SWTS. The unpredictable nature of these sinkholes and the continued occurrence was a source of concern for the safety of the staff and facility and functional access to it.

The City’s Project Goals

Access

The City’s planning goal was to find an optimal, easy access location for the new SWTS. The Petroleum Road SWTS was problematic due to limited access and natural disasters historically occurring on the access road. Alternate routes to the old SWTS would need to be closed due to nearby sinkholes. The alternate route was less convenient resulting in lost customers due to the inconvenience of the added travel miles. The new SWTS is located on property The City already owned (saving on overall project costs) and allows for easy access by customers and employees alike. It is also now located near the current City of Cape Girardeau Public Works facilities that are used by the public. The goal of easier access for customers to use The City facilities was fully accomplished.

Expanded Recycling

The City wanted to expand the current recycling program. In order to accommodate this, the new SWTS includes an area for trucks to unload single stream materials (SSM). The current SSM in The City consists of paper/plastic products and aluminum/steel cans. There was a need for a larger area to unload these materials. Having two areas to unload recycling materials (SSM at the SWTS and cardboard at the Recycling Center), allows The City to eliminate mixing the two products and shipping cardboard separately, which saved cost and helped generate more revenue. The increased space provided the opportunity to remove loose cardboard from the SSM area and the tipping floor, allowing for more cardboard recycling. Currently, the only opportunity for The City to recycle is through a trash hauler with a container at their location. By merging operations with Republic, The City can now provide the opportunity for trash haulers to bring material to the new SWTS, weigh them, pay a minimal fee, and unload in the SSM area. In 2015 The City shipped out 3,361.12 tons of SSM and 666.75 tons of cardboard. The new, larger SWTS and contract with Republic has brought excitement to The City and community in the opportunity to increase tonnage and expand the recycling program.

Improved Efficiency

The City also considered increasing efficiency on residential routes. Currently, average weekly collection stops for recycling is just under 4,400 residents and an average of 8,900 refuse stops per week. The City is required to provide these services to residents each day regardless of any issues that may occur with the equipment or facility. The new SWTS is located in a more accessible area, allowing routes to be completed in a shorter amount of time, with fewer miles traveled, and decreasing operation costs. Additionally, this will save in maintenance expenses by decreasing the daily wear and tear on refuse trucks. Another added benefit of the new SWTS’ location is route drivers will have more time to complete their routes and won’t have to rush to complete daily routes. This should help make their jobs safer and less stressful. Once the residential drivers have completed their routes, they will be able to help the SWTS staff complete loading and assist in cleaning the facility at the end of each day. This relieves the work load and stress on everyone.

Increased Tonnage

The biggest opportunity to increase tonnage shipped out of the SWTS was to work with an existing disposal company. This would require the disposal company to close an existing SWTS and utilize the newly constructed, city owned SWTS instead. When the time came for The City’s waste hauling and disposal contract to be bid out, a decision was made to create a contract to work with the disposal company, and make the deal beneficial for both parties. The City’s old Petroleum Road SWTS shipped out <100 tons of trash per day. One of local disposal companies, Republic, owned and operated an existing SWTS. The Republic SWTS shipped out approximately 77 tons per day. If the two SWTS’ and operations
were merged, the first day of the contract would see an increase in tonnage shipped by 77 tons. This merge would also benefit Republic by offering them the opportunity to increase their business. Republic would accomplish this by utilizing The City’s new dump site rather than their existing SWTS. The shorter drive time means trucks can stay on routes longer and use less fuel. Bringing more refuse to The City’s new SWTS will help increase tonnage shipped to the landfill.

Improved Customer Service
One of the primary goals for The City was to provide better service to customers. The old SWTS’ size is not sufficient to service collection trucks, trailers, and customer needs. When only a small number of customers would be on the tipping floor for drop offs, a line of waiting vehicles would form. A larger tipping floor and separate, safer unloading area for smaller vehicles (away from the larger refuse trucks) was necessary for The City’s customers. This would also keep waste haulers out of a waiting line and on their routes, collecting trash. Waiting times are anticipated to be minimal with traffic being separate and two unloading areas. The City believes this will lead to safer, happier customers and employees.

New Facility Development
In 2010 the development of the new Cape Girardeau Corporate Circle SWTS began from three significant forces. First, the Petroleum Road SWTS was old and in need of major repairs. Most notable of these was the scale, which was very old and had been repaired many times. Maintenance parts and support for this necessary function were becoming scarce. Second, the physical location was proving to be vulnerable to natural calamities. The old SWTS was located near the Mississippi River, which made it vulnerable to flooding. The station’s operations were impacted by flooding in 1993, 1995, 1997, 2011, and 2015. Temporary levees and pumps had to be set up to maintain access and function of the old SWTS when moderate to severe floods and sinkholes occurred. The sinkholes in the area were problematic for dependable access and safety. Third, The City had a Negotiated Agreement with the Missouri Department of Natural Resources (MoDNR) for a new Wastewater Treatment Plant (WWTP). A condition of the negotiated agreement was The City’s development of a Supplemental Environmental Project. A new SWTS became this project, with its associated deadlines defined by MoDNR.

The new Cape Girardeau Corporate Circle SWTS planning effort began in 2010. The first attempt to gain Council approval met significant opposition. The project concept was for a multi-use facility on a parcel of land across the highway from the Public Works site, which The City did not own. The proposed layout would accommodate the recycling center, SWTS activities, and allow for future growth. This was a fairly large scale project. The estimated cost for the proposed project was $5.5 million and would have been bid out as a normal public construction project. The City Council declined to give approval for this project primarily due to cost concerns. The project stalled at this point and no further action was taken.

Months later, a new idea was considered and in early 2014, discussion of a possible design/build Project began. In the early stages, City staff were told a design/build approach could not be done due to legal limitations. Missouri laws prohibited public sector agencies from pursuing design/build projects. Further research by City staff found Missouri law allowed such an effort with some guidelines. The primary requirement of the guidelines was The City must be classified as a “Charter City” in the State of Missouri. Cape Girardeau is one of these Charter Cities. Thus, with some creativity, The City was able to develop a project concept that complied with all the necessary conditions of the law allowing them to move forward with the new SWTS as a design-build project. The City was still under the regulatory obligation to provide an environmental project as a condition of the WWTP Agreement. After many hours of discussion with The City Manager and City Council, approval was received to proceed with the design/build concept to build a new SWTS. Conditions for this approval required a strict understanding that budget limitations would be firm. A budget amount of $3.9 million was agreed upon. Many hours of preparation were required to develop specifications for the project to meet the expanding needs for waste collection and disposal and to ensure the project was brought in at or under budget. The subsequent Request for Proposals (RFP) were published in August 2014, with only eight weeks for responders to attend the pre-submittal meeting, visit the site, and submit questions and a final proposal. The short response period was due to timelines contained in the MoDNR Agreement. Proposals were received on October 6, 2014 and evaluated on a predefined matrix of scoring criteria. Republic’s proposal was selected as the best fit for The City’s overall needs. Part of Republic’s proposal was to have Cambridge as the design/
build firm and Weaver Consultants Group as their solid waste permitting consultant. The project was awarded to the Republic/Cambridge team in December 2014. An example of achievement through creativity and commitment.

**Site Selection**

One of the initial questions for this project was whether to upgrade the existing facility or relocate. An upgrade was expected to be less costly. However, there were serious concerns about the problematic, natural calamities at the Petroleum Road SWTS operation including the susceptibility to flooding and existence of sinkholes in the immediate vicinity. These concerns led to the decision to relocate the facility. The site that was considered for the initial plan was no longer available. However, The City owned property on the opposite side of the same intersection. This property would be adjacent to the new WWTP and the Public Works facilities. The new site was a total of 3.5 usable acres that would be required to accommodate the new SWTS activities. This provided some challenges as the site is quite small for a SWTS needed to process up to 500 tons per day (TPD) in the future. However, a workable plan was developed and the idea of developing a campus concept for the Public Works functions was considered. If the new SWTS could be designed to fit on the available property, the campus concept would work. Cambridge was challenged to develop a site plan that would work for the new SWTS and requirements. This new plan would necessarily be smaller than the former one; it would not accommodate the recycling center or provide maintenance space for Republic to service their fleet (which proved to be a challenge later in the process). The new facility and site still needed to provide space for an increase in waste stream volumes. There were three significant advantages to this site. One, it was located away from the river and the sinkholes... a big advantage. Two, The City already owned the land resulting in large savings, and it was next to existing Public Works facilities... another big advantage. Three, it was located on a significant highway with easy access to other major roads in the area, including Interstate 55. Cambridge was able to develop an exceptional site layout that provided all the necessary functional elements and designed the facility to match the appearance of the surrounding Public Works facilities. The outcome was an appealing visual presence of the new SWTS. It fits well into the appearance, aesthetics, and functional use of the immediate area. The campus layout allows for all the Public Works staff to work close to the main facility and provide the various services in a much more effective and efficient manner. An example of cooperation and commitment achieving success.

**Funding**

A final challenge was developing a funding strategy for this project. The funding for the capital investment in this new SWTS was provided through a creative mix of revenue sources. This included some casino revenue as well as disposal fees and annual lease payments, for the use of office space, to be paid by Republic over the term of the agreement. Another item was The City’s decision to eliminate a very impractical lugger service that had been provided to the residents for some years. This reduced the Solid Waste Division staff by one through attrition (not layoff). The casino returns, recurring revenues from Republic, and salary savings from the dissolved position would be used to repay approximately $3 million of debt issued for the construction of the new SWTS. It is noteworthy to mention that The City has been able to fund this new facility without a fee increase to the residents. An example of creativity and commitment to accomplish the financing for the project.
assured continuity of service for solid waste disposal and provides The City residents with a stable cost for residential solid waste services for a number of years. Further terms include Republic’s lease of office space from The City in building adjacent to the new SWTS for their operations and support staff. The Petroleum Road facility’s permit as a SWTS will be terminated once Corporate Circle is fully operational. Further terms include Republic’s lease of office space in the new SWTS scale house and administration building for their local hauling operation and support staff. Meeting the fleet maintenance condition proved to be challenging. In the beginning, there was consideration of giving Republic one of the bay areas in the current Public Works Fleet shop for their maintenance. During exploration of this concept, many undesirable elements were uncovered. These included insufficient space, logistical difficulty in preventing access into The City fleet area, costly tasks necessary to separate electrical services, and providing separate air and lubricant capabilities. The City’s Public Works staff proposed the idea of constructing a new maintenance building across the street from the new site. The concept was for a new 40 ft. x 40 ft. pre-engineered metal building with one service bay, a bathroom, and storage space. In order to meet time and budget constraints City staff completed the site design, which included stamping of the plans by a licensed professional engineer. The City staff negotiated an agreement with a local builder. This builder was already involved with the new SWTS project as a subcontractor. In order to meet budget limitations the builder would install the footings and erect the building and City crews would install the floor, electrical, plumbing, and complete site improvements, such as stormwater detention, driveways, and sidewalks. With The City Manager’s approval of the concept, the Public Works staff approached Cambridge with the idea. Would Cambridge process a change order to the project agreement to add the new maintenance building? This was somewhat unusual since The City had done the design work and negotiated the building package. The City asked Cambridge to incorporate the added work into their contract at the cost already negotiated. In December 2015, Cambridge agreed to this change and was very cooperative; the contractor completing the maintenance building erection was already being managed by Cambridge for work on the SWTS, making it an easy request to accommodate. The Cambridge field manager would oversee the work and ensure the quality The City expected in this facility. The building work was fast tracked with completion in April 2016. This building is to be owned and maintained by The City but is dedicated to Republic for use during the length of their contract to complete fleet maintenance. Again, success through creativity and cooperation.

**Key Design Features**

All SWTS’ designed and built by Cambridge focus on three factors: safety of operations, long-term durability, and operational efficiency. All customers have different styles of operating their facility, but in the end, it’s typically all about these three items. Once the customer’s throughput needs are understood and the site location is chosen, Cambridge dives into the details on how the building and site layout will best serve the end user. The City was no exception.

**Challenges of the Old Petroleum Road SWTS**

The City had looked at utilizing the Petroleum Road SWTS site for the new SWTS, but given the environmental conditions and challenges posed by the site, the decision was made to find a new location. This facility, as mentioned previously, was approximately 2,000 sq. ft. and utilized a raised tipping floor to create a push pit application. This was both unsafe and inefficient based on the small volumes it currently processed. It was also located remotely from the other city operations and, due to the recent environmental issues, only had one road for access. All these factors led to the decision to utilize the new property adjacent to other city functions.

Once the decision was made to construct a new SWTS, the next steps were to determine the best design and parameters for the new facility.

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Republic and The City both wanted to design a safe, durable, efficient facility. Safety concerns are dealt with by having overhead doors identified for each customer to utilize one at a time, the site uses traffic patterns to help to avoid accidents, the building has adequate lighting for day or night operations, and the scale is equipped with stop and go signals for managing traffic. Traditionally, the SWTS is equipped with a camera system and will require employees to utilize proper Personal Protection Equipment (PPE) when on site. Durability goals include that the floor would not be replaced for 12-20 years, depending on throughput and operations; the push wall should last indefinitely given the steel embedment; and the heavy-duty design of the building itself should adequately protect it to avoid any major damage, leading to a long life. Efficiency is created by limiting the number of employees and equipment required to operate the site on a daily basis. The design allows for the SWTS to be run by as little as three employees. This would consist of one loader operator, one scale operator, and one laborer to help with site maintenance, traffic, and other items that arise daily. In some instances, if live loading isn’t utilized, The City would need a fourth person to shuttle trailers around the site. The only equipment required to run the SWTS would be a four-wheeled loader (such as a Volvo L90 or similar) and a backhoe.

### Parameters

The parameters for the new SWTS were set through an analysis of projected community growth and waste generation metrics; these determined the new facility’s capacity. The Corporate Circle SWTS was designed to accommodate the Municipal Solid Waste (MSW) and single-stream recyclables of The City for the next 30 years. The City projected the facility would operate 10 hours per day and need to handle 400 TPD initially, with future growth up to 500 TPD. This led the Cambridge team to design the building with three tipping bays, one loading bay, and one drive-thru pit. The 9,600 sq. ft. SWTS is deep and has tall push walls to store over 320 tons of material on the floor without impacting operations. A lift and load application with a 7’ differential between the pit and the tipping floor was utilized in lieu of a push pit or compactor system. This was a way to keep construction costs down and limit the number of employees required to operate the SWTS. A lift and load application such as this means the loader operator can load the outbound trailers and tamp the material in order to get the compaction required for the desired weights in the trailer. A loader would need to be purchased with the proper modifications to make this happen as it is standard in the industry today with many companies. In addition to the sizing of the building and ensuring safe operations, the site was designed to handle many different inbound material streams. The site design called for different areas to accommodate customer material drop-offs of white goods, green waste, and other non-MSW streams as The City preferred to keep these separate from the SWTS. An additional facility design constraint was to avoid incoming/outgoing and customers/staff traffic crossing paths. Every point where vehicular traffic paths cross present an increased opportunity for accidents and injuries. Though the Corporate Circle SWTS site is relatively small, the efficient traffic flow removed cross traffic from access routes to the SWTS increasing safety and minimizing the opportunity for accidents. An additional parameter for the facility was stormwater management requirements of the local governing authority. The new SWTS required maintaining flow to pre-development levels.

### The Design

The design for the new SWTS integrates best-practice approaches used in SWTS’ across the United States. These include building orientation, leachate containment, drive-thru pit, durable materials, lifts and dump loading, and robust building design.

#### Building Orientation

The new Corporate Circle SWTS was oriented on this site to have the unloading doors facing south. This positions them away from the sight-line of all adjacent roads and properties. In addition, this is away from the prevailing winds, which will help minimize wind-blown debris and...
odors. Having the rear of the building near the entrance also allows for a preferred traffic pattern and, aesthetically, leaves a fairly attractive wall visible to traffic. Also, the building will blend into the surroundings, helping to keep attention away from the facility.

**Leachate Containment**
The design was sensitive to retain any leachate contained in the waste for conveyance to the municipal sanitary sewer. The tipping floor and loading pit share a large drain to capture these liquids. The drain is fitted with a filter screen to preserve flow and keep large material out of the drain. After this material is collected, it is conveyed to a sand/oil separator. This removes deleterious materials from the liquid and then flows through a sampling manhole and on to the sanitary sewer for processing.

**Drive-Thru Pit**
Trailers enter the SWTS through a loading pit on the northeast side of the building, proceed through the building (after being loaded), and exit on the southeast side. This is an ideal arrangement to prevent the trucks from having to back into the loading position and, when exiting, travel with other vehicles on site to the scale.

**Lift and Dump Loading**
The building is designed for lift and dump loading. This type of loading arrangement proved to be most appropriate for this size SWTS as it allows trailers to be loaded with a wheeled loader. Once filled, the loader will be able to tamp the top level of material to ensure effective compaction and distribution in the trailer. The old Petroleum Road SWTS suffered difficulties getting trucks to hit their weights.

**Robust Design**
Constructing the new SWTS of durable material is important, but how those materials are assembled is equally important. At the unloading doors, there are 5' tall steel encased, concrete-filled protective bollards that are integral with the building foundations. These assemblies ensure the doors and the building structure cannot be damaged by the unloading trucks or the loader operating within the building. In addition, extensive use of steel embedment in critical wear areas, and steel closures provide a rugged assembly for the transferring of MSW wastes to transfer trailers.

**Lighting**
The SWTS was outfitted with large overhead doors that will typically remain open during the operational period as well as translucent panels at the top of the three main sides of the building. This will allow ample amounts of natural light to enter the facility and limit the use of lights during daylight hours.

**Tall Ceilings**
The SWTS is designed with overhead doors
so all overhead objects are out of the reach of any type of tipping vehicle.

**Cleanliness**
The goal of any SWTS is to limit the quantity and types of vermin that can live within the facility. All solid waste facilities that process or load waste are at risk. Cambridge designs facilities that don’t have “pockets” or other areas where these vermin can reside. The entire building is free of potential homes and hiding areas which makes long-term operations easier and leads to less complaints overall.

Along with the SWTS, the site also accommodates employees with an adjacent office building. This office building houses the scale operator, sales office, operations support (such as dispatch), employee break room, and men’s and women’s locker rooms. This new office building will allow the facility tenant, Republic, to keep their employees on-site to manage the day-to-day activities while also saving them money by co-locating with The City’s SWTS operation staff in lieu of having separate facilities.

By following proven strategies in use on numerous facilities across the country, this project is built on a foundation of lessons learned and best-practices to ensure an effective facility that will stand the test of time.

**The Construction**

Construction of the new Corporate Circle SWTS has been very successful. The facility was completed within the project budget of $3.89 million with the build being completed in approximately 30 weeks. The Cambridge team worked diligently to overcome the loss of 31 days from weather due to the nature of starting construction in August 2015 and working through the winter. The completed facility was officially turned over to The City the week of April 11, 2016.

The Corporate Circle SWTS was constructed in an efficient sequence so as to streamline the construction process. The site was graded and prepped to allow for construction traffic; then the lowest point of the building (the pit) was dug and footings and walls were poured. After that, footings for the perimeter push walls and building piers were excavated/poured and the push walls and piers were poured and finished. The site work commenced in terms of the utility installation and site concrete paving. This work carried up until early November. At this time, the push was to get the facility under roof so work could continue during the winter months. The metal building was erected and completed in January and then the electrical and sprinkler components were installed. Construction of the office building was concurrent with the metal building erection. The tipping floor was poured when the weather allowed in February and then all overhead work was completed. The SWTS was completed in late March, the office building finishes were completed in the first week of April, and the site work finishes (such as signage and landscaping) were completed the week of April 4.

**Environmental Control & Regulatory Compliance**

The City’s SWTS was designed and is operated with the focus on protecting the environment while serving the community by providing a practical approach to managing MSW and recyclables. Construction of the new facility required a number of environmental permits and approvals prior to beginning construction including:

- MoDNR Solid Waste Processing Facility Construction Permit
- NPDES Stormwater Permit
- NPDES Land Disturbance Permit
- City Stormwater Management Permit
- MoDNR Air Pollution Control Permit
- Applicability Determination

The primary regulatory agency is the MoDNR Solid Waste Management Program. MoDNR oversees the permitting and operations of the facility. Several of these permits will remain in place during operation of the SWTS. All required permits for construction of the SWTS have been received. An Operations Permit will be received before actual operation of the facility can begin.

The City is committed to recycling and offering alternatives to waste disposal. A separate recycling bay at the new SWTS is dedicated to co-mingled recyclables. In addition, recyclable materials will be mechanically recovered from the MSW tipping floor for further recovery. For ease, the SWTS was strategically located across the street from the recycling center. In addition to the SWTS, a public drop-off area is provided to allow the community a safe and environmentally sound manner to drop off materials including dedicated pads for yard waste and white goods. The citizen drop-off and recycling area shall dramatically decrease roadside dumping and offer easy, convenient recycling in conjunction with the residential curbside recycling program.

All recyclables and solid waste processing will occur inside the enclosed SWTS building, minimizing the amount of noise and odors emanating from the facility. In addition, the loading pit and bays are secured by overhead doors. In order to prevent access by vectors or the elements, the doors will...
be closed when the SWTS is not operational. The City will implement a daily cleaning schedule of the tipping floor and the transfer trailer loading areas to reduce odors, dust, and vector problems. The entire site is paved to prevent dust migration and assist with dust control.

The city also included LED lighting in the office, SWTS, and yard areas for energy efficiency at the site as well as with translucent face sheets in the wall panels allowing the use of natural daylight.

### Leachate/Stormwater

The SWTS is constructed to minimize stormwater coming into contact with MSW. The approach areas to the building have been graded away from the structure to minimize leachate generation. In addition, the south concrete ramp to the transfer trailer loading pit, drains to a stormwater grate to minimize stormwater draining into the pit area. An isolation valve has also been included as a precautionary measure to ensure leachate is not discharged as stormwater coming into contact with the SWTS is constructed to minimize stormwater runoff must be completed with a report and submitted to MoDNR as a required activity for the SWTS. Any incidental liquids contained within the solid waste flow along the sloped tipping floor and drain into the loading pit. Internal piping will route this liquid through an oil/water separator and pump it to the existing sanitary sewer piping to be directed to the Cape Girardeau WWTP (located adjacent to the SWTS) for final processing.

### Performance, Economics, & Cost-Effectiveness

#### Performance

**On-Site Queuing**

The site accommodates up to ten inbound collection vehicles at any one time before they approach the scale. These trucks can queue while not hindering the outbound vehicles or the inbound/outbound transfer trailers standard traffic patterns. This will allow the operator to deal with peak periods of inbound vehicles while not causing traffic issues off site.

#### Economics

**Cleanability & Reduced Maintenance**

The building and site are constructed of durable materials that are easy to clean (all metal and concrete) and will last for a long time. The site is all concrete pavement in lieu of asphalt which will last longer and be more durable in the colder northern temperatures, enduring the freeze/thaw cycles. This will also better withstand the heavy commercial truck traffic and turning.

**In-Building Storage**

The SWTS has been designed to store 320 tons per day of material in order to help with peak inbound volumes, rain events or other events that may hinder typical daily operations. The material can be stacked up to 14’ tall without negatively affecting the building in any way.

**Customer Convenience & Safety**

The site accommodates 3rd party customers and residents in a safe and effective manner by providing designated areas outside the SWTS itself for collection of various items such as white goods, organics, and other items. In keeping the residents and small 3rd party haulers off the SWTS floor, they are limited in interaction with commercial vehicles and the equipment which helps to ensure their safety.

**Drive-Thru Pit**

Having one point of entry and exit for outbound tractor trailers helps to increase throughput capabilities and reduces the amount of backing a driver encounters. The tractor trailers utilize a clockwise traffic pattern then travel through the pit and then leave the building, passing over the scale to get their certified weight. This creates a safe and efficient pattern whether they live load or load and stage trailers.

**Equipment**

Due to the lift and load application, the site will use two pieces of equipment including a loader (Deere 644K) equipped with extended arms to increase tamping abilities and a backhoe. The loader is equipped with a 4.5 yard grapple bucket and payload scale.

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Pit Ramp Concrete Pour

Pit Door Installation

East Retention Area

Paved Parking Lot Area & Lighting

Waiting Area for Inbound Traffic to Scales

In-Building Storage
to track weights as they are loaded into the trailer. Utilizing this equipment, the operator can load trailers with maximum tonnage in 12 minutes which could produce up to 120 TPH of outbound material.

**Building Safety Components**

The SWTS is constructed of all non-combustible components and is equipped with a fire sprinkler system, pre-packaged eye wash, fire extinguishers, spill kits, fire department connection (FDC), and two 1.5” wash down hose. All of these are integral parts in helping to keep the building safe for all parties.

**Site Monitoring**

As part of the Corporate Circle SWTS Safety and Operations Plan the station has included a few closed circuit cameras. These are focused on three areas of the facility. The primary use is for observation of the tipping floor area. The cameras are set up so the operator in the office can see the activity on the tipping floor. This will allow that operator to keep an eye out for any safety issues for the workers and the customers. It will also allow the operator to observe and exercise some control of the traffic going from the scale to the tipping floor so it does not get too crowded. There are also cameras to observe and record activity in the office space. This will be an aid in addressing any complaints about the operator’s actions or service. It will also aid in deterring any issues with cash transactions. The third area that will be monitored is the entrance and parking area in the north part of the site. These cameras will allow the operator to see activity at the entrance gate and monitor any vehicles in line for the scales. These cameras will allow the operator to see the Republic trailers parked in their spaces and watch for any safety issues or unauthorized visitors in that part of the grounds. The City believes these cameras will be a very useful tool in the efficient and safe operation of the facility.

**Standby Generator**

Although the SWTS itself can operate without power, the owner had a 50kw generator already available and wanted to provide it to the site in order to ensure that the office, employee areas, and scales can operate at all times. A transfer switch and other required capabilities were installed in order to connect the generator. The site will now be able to operate at all times regardless of any local power outages.

![Generator Before Installation](image1)

**Site Weighing Technology**

The site utilizes one scale for both inbound and outbound vehicles. The above ground style 70’ scale allows for ease of maintenance and cleaning. All commercial vehicles will have stored weights, so they will only have to weigh in once and leave without weighing in a second time. All transfer trailer vehicles will have to weigh out only and will bypass the scales on the way in. The only vehicles that will be required to weigh in and out are small 3rd party customers that are not repeat or that use a different vehicle/trailer to drop off materials. This will limit the amount of vehicles that need to pass over the scales and will allow the operator to only require one scale for all traffic. The traffic will be managed utilizing a stoplight system on the inbound and outbound side which will direct traffic safely based on the controls of the scale operator. The loader will use a bucket scale which tracks all materials as they are loaded.

![Scales & Administrative Offices](image2)

**Cost-Effectiveness**

As mentioned previously, the goal was to keep the project under $4,000,000 in order to make the contract with The City’s business partner and tenant, Republic, to make financial sense and see a Return on Investment (ROI). This was achieved while still meeting the material handling and throughput requirements of the facility.

The team was able to avoid any cost change orders and uncover any unknown issues early in the design process so as to limit the risk once construction began. The design and environmental design teams did a very thorough job of identifying any potential risk areas with agencies or environmental items that would need to be dealt with. Together they were able to mitigate all risks and help the project stay on target.

**Equipment & Performance Measurement**

Republic utilizes a maintenance tracking program for all of their equipment called "Dossier". This program stores records of all maintenance activities completed on each piece of rolling stock as well as notifies the dedicated in-house mechanics of required maintenance activities.

Republic utilizes a significant array of metrics to its performance, including route productivity, route efficiency, and synergies associated with utilizing a shared workspace and centralizing the operating location closer to the center of the customer base.

**5 Worker & Customer Health & Safety**

When it came to designing the new SWTS, The City had a number of issues with employee safety and areas where accidents or injuries were occurring. These injuries could be prevented with better design and work processes. City personnel were also looking for ways of separating smaller vehicles and larger refuse equipment with the hope of having two separate unloading areas. The tipping floor of the old Petroleum Road SWTS is extremely small and cramped. More floor...
space was needed to operate the SWTS equipment without having contact with refuse trucks. The pit area of the old SWTS was originally designed for packers. The old facility had been re-designed several years ago as the width and height had always caused issues for the employees to safely operate the yard truck. The City was looking for a design that would address all these issues plus a state of the art facility that everyone could really be proud of.

**Separation**

One goal was to separate smaller vehicles and bigger refuse equipment. Many problems occurred due to the length of time it took smaller vehicles to unload, which created extended waiting periods. The safety issues of people walking around the smaller vehicles while the bigger refuse trucks were unloading next to them was a problem requiring a solution. The City asked Cambridge to incorporate in the design a facility that had a specific area for the slower, smaller vehicles to dump away from the bigger refuse trucks. The design was developed with a spot not far from the scale area where the scale operator could monitor vehicles in the drop off area and also be able to easily point out the dumping area for them to unload. Included in the design was a separate area for residents to unload appliances, brush, and limbs.

**Training**

Since The City now has a close working relationship with Republic Services, they asked what types of training tips could be shared. These tips allowed The City to incorporate training practices into the Operation Manual. The City’s Public Works department is now able to complete training on waste screening and site safety procedures, discuss operations, problems, modifications, corrective measures, and procedures for identifying and handling hazardous materials. The City staff will train more employees in how to operate the SWTS equipment, properly spot and direct traffic onto the tipping floor, and identify improper waste brought into the SWTS. The new SWTS will have at least one trained operator working on the tipping floor at all times. Since recycling material will also be brought into the SWTS, there is an area of the floor designated for single stream material. Additional resources will be used through training inmates from the city jail to separate cardboard from other SSM. Cardboard will be separated and baled in the recycling center while the SSM will be loaded loosely in open top containers and shipped to Republic’s recycling center. Operators will also be trained to spot large amounts of cardboard and be able to use the hi-lift to remove those cardboard piles from the waste stream and placed in the cardboard recycling containers. After training has been completed “Training Record Sheets” will be signed and dated for documentation purposes and filed as it states in The City’s Operation Manual that was submitted to MoDNR.

**Procedures**

The City laid out procedures to follow in their Operation Manual that was approved by MoDNR officials. The manual outlines facility operations, wastes accepted and not accepted, equipment to be used, training, safety procedures, permits, and what to do in case of emergencies. These procedures will be reviewed regularly with all the Solid Waste Staff to ensure everyone is familiar with the operation manual. All staff will be given a copy of the operations manual and a copy will be kept on hand in the scale office.

**Safety**

One of the areas The City was looking to improve in the design and construction of the new SWTS was safety issues that had been problematic over the last several years. Since 2010, The City had seven minor accidents and four minor injuries. In looking at those accidents and injuries, The City wanted to develop methods to reduce those numbers. All seven accidents were relatively minor in nature, four of them included the loading trailer rubbing up against the pit wall or the pole the tarp is attached to hitting the pit wall. The goal was to make sure the new pit was larger than the pit in the old SWTS to give the employee more room to maneuver the trailer. Two other accidents also involved the pit area. The first occurred when the trailer exiting the pit busted a line due to the driver running over loose trash that fell down the side of the wall while loading the trailer. The second was while pulling the trailer into the pit, the trailer was raised up against the pit wall or the pole the tarp...
all the way up, hitting the garage door. One accident not involving the pit area occurred while the trailer was driving around the facility the yard truck hit a pothole; when this happened, the jack legs on the trailer hit the ground and bent them because the truck was still moving on impact. All of these accidents could possibly be prevented at the new facility because the entire property is concrete and the pit area is wider and taller than the old SWTS.

The City also had four minor injuries since 2010, and new measures have been put into place to help prevent them from occurring in the future. The old SWTS included a hook in the concrete that roofers would use to help unload their trailers. One injury occurred when an employee cut his finger cleaning this area. The other three injuries occurred due to employees stepping on objects as they walked in trash piles. With the bigger floor, ample room is now available for the staff to walk around trash piles rather than through them. It is important to the City that goals are set to be injury/accident/incident free. New first aid kits have been included in both break rooms and are readily accessible to employees. All employees have been supplied with new PPE such as: vests, gloves, eye wear, and ear plugs for the new facility. These same supplies have also been distributed to work release inmates that will be working on the recycling side of the SWTS. The City will also now be holding two safety meetings per month (goal 24/year) with topics varying from meeting to meeting.

This goal has been met by accomplishing the construction of the new SWTS without a rate increase to the residents and customers. Further, the long term nature of the arrangement with Republic is expected to provide reliable and affordable service for the next twenty years.

Another concern of The City’s citizens and leaders has been to construct a facility that meets all environmental regulations. This concern extends to the operations of the facility too. To meet this goal, the Design team has made all necessary submittals to MoDNR for review and approval. All required permits have been obtained through the appropriate agency divisions.

The City has been creative and culturally connected in communicating with the public. This has been accomplished by using Facebook, Twitter, and other social media to provide ongoing and updated information about the project. City leaders have applauded the progress of the work and the commitment to meet the challenging schedule for the project. Through many challenges and adjustments the project has been completed within budget restrictions.

Facility Appearance & Aesthetics

The City and Cambridge worked on ensuring the new Corporate Circle SWTS fit into the Public Works campus by choosing materials for the exterior that would match the adjacent Public Works campus facilities. The facility also faces away from the street to minimize the impact of the SWTS appearance when the overhead doors are open and collection vehicles are unloading material on the tipping floor. Additionally, The City put great efforts into having little impact on the natural landscape near the facility and wetlands, located a short distance from the new SWTS, during construction and future preservation.

Public Acceptance, Appearance & Aesthetics

The concerns of the stakeholders in The City and surrounding area are focused on reliable, cost effective solid waste services. Throughout the various stages of the project The City leaders have expressed an uncompromising demand to provide a valuable service to The City’s residents and commercial customers at an affordable rate.

Public Acceptance

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Public Acceptance, Appearance & Aesthetics

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The design/build of The City of Cape Girardeau’s Corporate Circle Solid Waste Transfer Station began in late 2014. The creativity, cooperation, and commitment of The City of Cape Girardeau’s Staff, Cambridge Companies, and Republic Services brought this facility to life. The City worked from initial concept through complete construction developing plans with partners and implementing outside-the-box thinking to ensure their staff had the tools necessary to complete their jobs. Additionally, Cape Girardeau citizens had participation on this project resulting in their comfort with it’s construction. The Corporate Circle Solid Waste Transfer Station has met all the goals The City set out. It also meets all environmental requirements to keep their city clean and added more safety measures and operational guidelines to ensure staff and citizen’s safety.

Despite the process being riddled with speed bumps and obstacles, The City of Cape Girardeau’s Corporate Circle Solid Waste Transfer Station’s design and construction was completed on March 28, 2016 by Cambridge Companies. The facility was handed over to The City at this time. Republic will be operating it’s local hauling operation out of The City’s new SWTS in June 2016, after The City receives approval from the MoDNR in the form of an operating permit.

**Future of Old Petroleum Road SWTS**

As the new facility is commissioned for operations, the old station will not be removed from service. The City provides leaf collection service to the residents and the Petroleum Road SWTS will be used for storage of the leaves each fall and winter until they can be mulched and disposed.