

**SWANA RECYCLING
TECHNICAL ASSISTANCE STUDY**

FINAL REPORT

BERKS COUNTY SOLID WASTE AUTHORITY

**THE BERKS COUNTY RECYCLING CENTER
OPERATIONS AND SITE IMPROVEMENTS**



GANNETT FLEMING, INC.



HARRISBURG, PENNSYLVANIA

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SWANA RECYCLING TECHNICAL ASSISTANCE STUDY

EXECUTIVE SUMMARY

BERKS COUNTY SOLID WASTE AUTHORITY THE BERKS COUNTY RECYCLING CENTER OPERATIONS AND SITE IMPROVEMENTS

This study was conducted for the Berks County Solid Waste Authority under the Solid Waste Association of North America (SWANA) Recycling Technical Assistance program. Gannett Fleming, Inc. (GF) provided technical guidance to the Authority regarding operational and site improvements as reflected in this Report. This Executive Summary overviews project findings and recommendations developed in more detail in the full Report.

Processing over **550 tons of recyclables annually** and receiving approximately **200 vehicles per day**, the Berks County Recycling Center (Recycling Center) operated by the Berks County Solid Waste Authority (Authority) is a successful hub for managing residential drop-off recyclables in central Berks County. The limited access to curbside recycling in this predominantly rural setting magnifies the value of this program to the regional community as reflected by its popularity. Although high levels of participation at the Recycling Center are desirable – the success of the program is beginning to test the existing site capacity, design, and overall material management and facility performance. It is good timing for the Authority and this growing program to have received Act 101, Section 902 Grant Funding for site improvements and processing equipment.



Based on GF's site visit and evaluation, a number of conclusions and recommendations were developed and summarized in the following bullets. GF encourages a phased and thoughtful approach to implementing each stage of site and operational improvements. Our recommendations are preliminary; intended to set the groundwork for an improved Recycling Center that is more efficient, safe, and environmentally, socially and economically sustainable.

ES 1.0 - Conclusions (Summarized)

- The available site area and the existing site features are adequate to manage the current volume of materials and quantity of visitors that access the site. However, modifications of how materials and visitors are managed will improve facility performance, reduce operating costs and improve safety.

- Factoring in the cost of container service or “pulls” by Cougles, all commodities handled result in a cost per ton. Because commodity revenues do not fully offset the service cost for that commodity, operating cost reductions will generally have more impact on total system costs than improved commodity revenues (that are subject to change without warning).
- The relationship of material tonnages and servicing is reflected in the table below and reveals the particularly high cost for commingled material management.

Berks County Solid Waste Authority Recycling Center (January 2010 – February 2010) Commodity Containers, Pulls, and Average Tonnages			
Material	Container	Average Number of Pulls Per Month	Average Tonnage Per Pull
Mixed Paper	40 CY Roll-off	3	6.12
Commingled	20 CY Roll-offs (2)	13	0.955 tons
Loose Cardboard	40 CY Roll-off	None	None
Compacted Cardboard	30 CY Compactor	3	2.27

- The cost for managing commingled materials is **\$104.07 per ton**, making this commodity stream a target for improved management. Handling mixed paper is the lowest cost commodity at **\$9.23 per ton**.
- The revenue potential or market value for individual commodities, when they are commingled, is degraded. The extreme example is that commingled materials yield **\$32 per ton**, while separated aluminum would yield **\$620 per ton**.
- Staging and recycling electronics appears to be a good use for the facility.
- Existing asphalt is in moderate to very poor condition.
- The existing pad area for roll-off is in moderate to good condition and its condition does not impact container service or other operations. Replacing the entire 70' x 30' concrete pad at an estimated cost of **\$30,000** appears cost prohibitive/low priority.
- Traffic flow patterns are unorganized and do not optimize site use and heighten vehicle safety concerns, as concluded based on the following:
 - Insufficient signage and traffic devices
 - Designated vehicle areas are not identified
 - Multiple unmarked site entrances and/or exits
 - There are no gates to prohibit/manage vehicular access. Unchecked vehicle access increases liability/risk.

- The bank barn style of building includes an elevated barn floor favorable for efficient, “gravity feed” of materials (e.g. cardboard).

ES – 2.0 Operational and Site Improvement Recommendations

Operational Improvements: **Figure 2** at the end of this Report is a conceptual layout that reflects many of the recommended operational and site improvements. GF recommends the following operational modifications:

- **Implement operating cost strategies** – Align full cost accounting of the facility to continually evaluate ways to reduce operating costs and increase revenue return for materials.
- **Source-separate commingled materials:** With cost analysis confirmation, consider source-separating commingled recyclable commodities to achieve improved program economics (i.e. reduced service or “pull” costs and additional revenue per ton)
- **Modify Recycling Center configuration for recyclables handling and processing:**
 - North (upper)
 - Electronics
 - Cardboard – A 40-cubic yard roll-off staged in the barn. Feed the baler located on ground floor (see Figure 4).
 - South (lower)
 - Mixed paper
 - Commingled materials (and additional roll-off containers assuming commingled materials are separated into cost-effective individual commodities and/or streams).
 - Cardboard baler (staged inside barn on ground floor)
 - Cardboard bale storage area
- **Procure forklift** - to safely and efficiently manage site materials.
- **Confirm baler location and configuration** (see Figures 2 and 4).
- **Implement the continuous loop traffic flow pattern as shown in Figure 2**, which will include a gravel driveway around the Recycling Center.
- **Designate drop-off areas, vehicle staging and overflow areas** using signage and orange traffic cones. Direct and restrict traffic as needed.
- **Evaluate facility use by commercial sector** - Assuming site improvements are completed and the baler facilitates cardboard processing; consider accepting a

controlled volume of cardboard from the commercial sector. Register commercial vendors and prohibit open access to the site using a commercial receiving schedule set by the Authority and/or on an on-call system.

- **Pave areas as designated in Figure 2 and as recommended in this Report (in conjunction with final vendor information and final specifications):**
- **Apply a 3" high asphalt curb to direct stormwater** along the eastern edge of the facility adjacent to the Barn and supplemental buildings.
- **Utilize, do not replace, existing pad for roll-offs** at this time.
- Avoid use of asphalt as a substitute for any pad surfaces for roll-off container or baler staging areas.
- **Designate a single north entrance and a single south exit** (see Figure 2).
- **Within two years, complete a cost benefit analysis of installing a gated, key card access entrance to the facility** (see Section 2.1.4)
- **Confirm bale storage location(s).** GF has made preliminary recommendations that include "Bale Storage 1" as being a preferential location provided sufficient capacity is available in this location to store enough bales to fill a truckload.

**SWANA RECYCLING
TECHNICAL ASSISTANCE STUDY
FINAL REPORT
BERKS COUNTY SOLID WASTE AUTHORITY
THE BERKS COUNTY RECYCLING CENTER
TRAFFIC FLOW AND PAVING**

1.0 INTRODUCTION

The Berks County Solid Waste Authority (Authority) has operated the Berks County Recycling Center (Recycling Center) since 2008. The Recycling Center is a public recyclables drop-off facility owned by, and formerly operated by the County. The Authority has implemented a number of initiatives to improve the operation of the site to assure it is an effective, clean and safe public recyclables recovery center. The Recycling Center re-uses the infrastructure of an old barn and farm complex for its operations. The original farming configuration was not designed for recyclables recovery and the general layout and use of the site as a recyclables drop-off has remained unchanged since the recycling program started.

Based on vehicle counter figures obtained over a weeklong period in April 2010, the Authority estimates there are 75,000 visits to drop-off recyclables each year. Realizing the drop-off site required improvements and equipment, the Authority submitted an Act 101, Section 902 Recycling Grant in 2008. The Authority received notice of an approved Recycling Grant in 2010. \$87,634 was approved for paving and site improvements and \$37,880 was allocated for the procurement of a horizontal recyclables baler.

To assure the Recycling Grant funds are allocated in a cost-effective manner that optimizes the Berks County Recycling Center, the Authority selected Gannett Fleming, Inc. (GF) to complete an independent evaluation. The evaluation is paid for through the Solid Waste Association of North America (SWANA) Recycling Technical Assistance program. GF worked with the Authority to develop the following project tasks.

1.1 Scope of Work

- Task #1** GF will gather background information about the Berks County Recycling Center and will conduct at least one (1) site visit. During the site visit, the primary focus will be to evaluate existing site conditions and operations with consideration of traffic patterns for the purpose of developing recommendations for improving overall operations.
- Task #2** GF will document site visit findings and draft recommendations for the Berks County Recycling Center site and operations improvements.

Task #3 GF will prepare and provide the Authority with a project report including findings and recommendations. This task includes a review of the report by the Pennsylvania Department of Environmental Protection (PADEP) and response to PADEP comments. An electronic file of the final report will be submitted to PADEP and to the Authority. Two bound and one unbound hardcopies of the Final Report will also be provided to the Authority.

2.0 RECYCLING CENTER SITE INVESTIGATIONS

GF conducted a site visit on April 8, 2010 in order to gather background information from the Authority about the Recycling Center operation and to document and photograph existing site conditions, operations and traffic flow. The following subsections review the site observations and initial findings.

2.1 Site Operations

The Recycling Center is located on an old farm that is owned by the County. The site is for residential public use and the Authority discourages drop-off by commercial sector entities. The area surrounding an existing barn is the staging point for 20- to 40-cubic yard roll-offs and one compactor. With the exception of the compactor owned by Coughles Recycling, Inc. (Coughles), all roll-off containers used at the site are owned by the County.



With the exception of cardboard compaction, the Recycling Center operates as a transfer facility and there is no volume reduction or processing of materials prior to transport from the recycling facility. **Figure 1** at the end of this report shows the Existing Features of the Recycling Center.

2.1.1 Comingled, Mixed Paper and Cardboard



The primary drop-off materials include comingled materials (mixed glass, aluminum cans, steel cans, and plastics #1 & #2), mixed paper and cardboard. In 2009, the Recycling Center processed **560 tons** of recyclables. These commodities are serviced by, and delivered to Coughles Recycling located in Hamburg Pennsylvania. The roll-off containers are staged side by side against the lower, south side of the

barn (See **Figure 1**). The breakdown of container size, collection frequency and cost by commodity type is provided in the table below. The number of pulls per month and the average tonnage per pull is based on the average for the months of January and February, 2010. As expected with light, loose commingled bottles and cans that take up container volume, the number of commingled pulls is comparatively high and the recovery (by weight) per load is low. A separate 40-cubic yard container for cardboard is staged beside the cardboard compactor to collect material as needed prior to loading the compactor.

Berks County Solid Waste Authority Recycling Center (January 2010 – February 2010) Commodity Containers, Pulls, and Average Tonnages			
Material	Container	Average Number of Pulls Per Month	Average Tonnage Per Pull
Mixed Paper	40 CY Roll-off	3	6.12
Commingled	20 CY Roll-offs (2)	13	0.955 tons
Loose Cardboard	40 CY Roll-off	None	None
Compacted Cardboard	30 CY Compactor	3	2.27

Notes: Loose cardboard is the staging point for cardboard to load the compactor. Pickup frequencies vary based on volume received.

2.1.2 Electronics

Historically, only the area outside of the barn complex has been utilized to receive recyclables. Through hard work by Authority staff, the barn interior has been cleaned up and repaired to a condition where it can function to manage certain recyclables. The use of the Recycling Center as a permanent location to accept electronics to supplement County electronic collection events was approved at the Authority Board meeting on March 16, 2010.



Electronics deliveries are accepted by appointment and are stored inside the barn. Small electronics are placed in gaylord boxes and larger electronics are shrink-wrapped.

When 10 skids of electronics are accumulated, AERC Recycling Solutions is contacted for pickup and processing. The cost is **\$200 per pickup plus .05 cents per pound.**

Electronics recycling at the Recycling Center has not yet been advertised heavily so incoming quantities are projected to increase as public awareness increases.

UNICOR

Depending of material volumes and electronics program costs in the future, UNICOR may be an option to evaluate as the electronics program grows. UNICOR employs and trains inmates incarcerated in the Federal Bureau of Prisons and the program includes the operation of an electronics recycling program in Lewisburg Pennsylvania. UNICOR offers electronics recycling to Counties as follows:

- \$0 cost per lb. for nearly all electronics that are delivered to the facility
- \$10 for each TV or crt monitor over 19" delivered to the facility

UNICOR Recycling Factory

1000 William Penn Road

Lewisburg, PA 17837

Phone: 570-522-7692

Contact: Duane Lamper

dlamper@central.unicor.gov

2.1.3 Traffic Flow



Safe and efficient equipment utilization and traffic flow is a critical element of any recycling facility. The importance of these elements is magnified at the Berks County Recycling Center because the site is open at all hours and is without restriction to the public.

Based on GF's site visit, including discussion with Recycling Center staff, the following observations are noted:

- The site is heavily utilized. A vehicle counter was used for one week during April of 2010 and results are shown to the right:
- Vehicle cueing, defined here as the distance or space vehicles have to line up and park to unload recyclables, was not a problem during the site visit. However, cueing is sometimes very problematic at the site during times of heavy use, as reported by staff.

Day	Vehicle Count
Monday	237
Tuesday	196
Wednesday	169
Thursday	189
Friday	187
Saturday	182
Sunday	272
Weekly total	1,432

- Traffic flow is relatively poor at the site for the following reasons:
 - There are three (or four) possible site entrances that are not clearly marked, which is confusing to visitors.
 - There is insufficient traffic-related signage and no directional devices (e.g. cones) are used to guide visitors.
 - The total cueing distance from the location of the roll-offs to the edge of Hilltop Road is less than optimal when the Recycling Center is at peak visitation.
 - There are no designated areas for staging/parking to unload vehicles.
 - The site is not gated, so there is no ability to limit site traffic as needed.

2.1.4 Site Security

Overall, the Recycling Center has limited effective security measures. The site is not gated and is open all hours, year round. Having a part-time staff on site as much as 34 hours per week helps as a security measure, but visitors often arrive when the site is unstaffed. There is one security camera above the roll-off containers, but there is no signage displayed noting visitors are on camera and/or any penalties for not following posted procedures.

Securing public drop-off facilities that manage recyclables and compost products has seen increased popularity in the last 5-10 years. A primary security feature of sites that are not permanently staffed is to install a gate at the entrance/exit using a gated key card system. This trend of increased management and security of public drop-off sites is occurring for some of the following reasons:

- Increased need to reduce potential liability, particularly because general public access increases risks to themselves, others, and to equipment and other assets.
- Material is delivered from outside the host county or municipality, increasing recovery but skewing recycling figures and potentially adding operating costs.
- Increased contamination of recyclables caused by drop-off of unwanted materials or drop-off of trash and bulky items that require disposal.
- Improved and more cost effective technologies:
 - Cameras – security cameras are affordable and simple to use.
 - Pricing of electronic gates with key card access have decreased, making this tool more attractive.

Gated Keycard Access

Gated keycard access improves visitor accountability and can be a small tool to generate revenue important for a successful program. Securing a site with a key card access gate is a way to reduce liability by registering visitors, which improves accountability. Assessing an equitable annual registration fee is a way to recover a small portion of operating costs to improve program sustainability. Typically, the fee is structured to be low-cost for residents and higher cost for commercial vendors and contractors. Fees vary but some ranges observed in Pennsylvania are as follows:

- Residential: \$10 - \$50 annually
- Commercial: \$200 - \$500 annually

2.1.5 Site Signage

Because the Recycling Center is a public recyclables drop-off that is open all the time, clearly written and highly visible signage is critical. At the time of GF's site visit, the following things were observed:

- The Center lacks signage that effectively directs the flow of vehicle and visitor traffic entering and leaving the site.
- Nearly all of the sight signage lettering is smaller than optimal to effectively communicate the desired message.
- Signage is all text, and no symbols are used to reinforce the desired message.
- No penalties are posted (e.g. fines for illegal dumping) to discourage unwanted activities.

Signage at this public sight should streamline operations both in terms of managing traffic flow and assuring the quality of recyclables collected is maintained through clear, concise and graphical communication of procedures.

3.0 PAVING AND ROLL-OFF STAGING AREAS

3.1 Existing Paving Conditions

The road surfaces and the areas used to stage roll-offs and compactors at the Recycling Center are comprised of a variety of materials, and conditions vary as reflected by the photos below and noted in **Figure 1**. Some areas are paved asphalt, with paving quality ranging from moderate to very poor condition. Several areas currently utilized have a gravel surface that abruptly becomes asphalt. Although a few areas on site are comprised of dirt surfaces, they are rarely used in the current site configuration. Brick

surfaces are located in several areas across the site and most brick surfaces are in surprisingly good condition. The gravel in the upper area of the barn is in fair condition, but it will be impacted by new traffic patterns including hauling vehicles during ongoing management of electronics, cardboard and possibly other recyclables.

Paving design, and the application of paving across selected areas surrounding the Recycling Center should generate an increase in Recycling Center participation, increased recyclables recovery and changes to current activities and traffic flow at the site. Operational performance and site safety will be impacted by how the site is paved and where concrete pads for staging roll-off containers are located.



3.2 Roll-off Staging Areas

The staging area for the roll-off containers and the cardboard compactor is a combination of brick and concrete (bottom left photo above). The roll-off pad is approximately 70' x 30' or **2,400 square feet** (see **Figure 1**). The roll-off staging area is in moderate to good condition and does not require replacement in the near future based on current or anticipated uses.

GF concludes the following based on site visit observations and proposed future uses:

- Improved paving is necessary due to the existing condition of site surfaces and because recently implemented recycling activities and proposed site uses warrant paving on the north side of the facility.
- The north entrance shows evidence of alligator cracking, which appears to be caused by a combination of poor subgrade installation and inadequate asphalt thickness.
- The existing condition of the roll-off staging area pad is suitable for current and proposed uses.
- Most brick surfaces are in good condition and enhance facility aesthetics/historical value.

3.3 Paving and Concrete Pad Costs

GF contacted **EJB Paving & Materials Co.** and **Windsor Service** (The H&K Group) to roughly gauge the potential costs for proposed paving and/or concrete pad site improvements. The costs provided were not quotes and not based on any final design, final square footage, or other details required by the vendors for an accurate price total. As a baseline, GF used a 100' x 100' asphalt area and a 70' x 30' concrete pad, as summarized in the table below.

Item	Area Requested for Estimate	Rough Cost (not a price quote)
Asphalt (installed over gravel)	100' x 100'	\$25,000
Concrete Removal	70' x 30'	\$15,000
Concrete Installation	70' x 30'	\$15,000

Note: costs are estimates only to be confirmed by final vendor quote.

4.0 RECYCLING CENTER OPERATING COSTS

The Authority was able to quickly provide operation cost information during the course of this study and demonstrated clear knowledge of operating costs. Annually, the Recycling Center operating cost is about **\$30,000**, with **\$11,000** recovered through commodity revenue in 2009.

Analyzing the operating cost per ton for each commodity on an ongoing basis will guide the Authority in its decisions regarding the operation of the Recycling Center. In the table below, GF provides the cost per ton by commodity, which is particularly revealing for commingled materials. At the Recycling Center, the cost for managing commingled materials is magnified (as compared to curbside programs or at processing

facilities). There is a limited capacity or volume available in 20 cubic yard roll-off containers that are used to collect loose bottles and cans - this drives up servicing costs, which is **\$130 for each roll-off container pull**.

As shown in the table below, the cost for managing commingled materials is **\$104.07 per ton** using data from January and February of 2010. Commingled materials cost 11 times the cost per ton of mixed paper and about 3.5 times more than the cost of managing cardboard. The high cost is the dreaded commingled equations: high frequency of pulls multiplied by low tonnage and comparably low revenue per ton. The expenses below do not include the cost for Authority labor to manage materials at the Recycling Center. The Recycling Center has one staff person allocated a maximum of 34 hours per week, which is approximately **\$1,800 per month**.

Berks County Solid Waste Authority Recycling Center January – February 2010 Revenue, Expense and Cost Per Ton				
Material	Jan. – Feb. Expense	Jan. – Feb. Revenue	Tons	Cost per ton
Mixed Paper	\$780	\$440.76	36.73	\$9.23
Commingled	\$3,380	\$794.88	24.84	\$104.07
Compacted Cardboard	\$730*	\$299.64	13.62	\$31.59

*Includes \$125 per month compactor rental fee.

5.0 SUMMARY OF PRELIMINARY FINDINGS

GF's summary of observations and research finding related to the Berks County Recycling Center site condition and current operation is as follows:

General

- The Recycling Center site is clean.
- Overall, the available site area and the existing site features are adequate to manage the current volume of materials and visitors that access the site. However, modifications of how materials and visitors are managed can improve the overall performance of the site and reduce operating costs.

- The site does not have, but would benefit from, a forklift for use in moving and storing recyclables or other materials and items around the facility.
- Additional information is needed relative to existing electrical infrastructure as it relates to the selection of a cardboard baler. Consideration of annual kW loading, annual operating cost, and comparative payback analysis would validate final baler choice and possibly result in modifications to the existing electrical configuration to optimize utility usage and reduce operating costs.

Recyclable Commodities

- Requiring source-separation of commingled recyclables by visitors can improve the economics of the drop-off facility by reducing transportation costs and simultaneously increasing the commodity value of certain materials.
- Factoring in the cost of container service by Cougles, all commodities handled result in a cost per ton. In other words, none of the commodity revenues fully offset the service cost for that commodity.
- Handling mixed paper is the lowest cost commodity at **\$9.23 per ton**.
- The cost for managing commingled materials is **\$104.07 per ton**, making this commodity stream a target for improved management in order to reduce total operating costs for the Recycling Center.
- The recently implemented use of one or more of the barn bays as a staging area for electronics is a good use for this portion of the facility.
- The revenue potential for individual commodities that are commingled is greatly degraded when marketed as mixed materials. For example, commingled materials yield **\$32 per ton**. However, if aluminum was sorted from the commingled stream, it would yield **\$620 per ton**.

Paving

- Existing asphalt is in moderate to very poor condition. A combination of gravel surfaces and poor quality asphalt exists in areas that are recommended for new paving.

Concrete & Brick Pad

- The existing pad area for roll-off is in moderate to good condition and its condition does not appear to impact container service or other operations. The cost to remove existing brick and concrete and install a new 70'x30' concrete pad is roughly **\$30,000** based on local vendor information.

Traffic and Signage

- Traffic flow patterns are unclear to visitors and do not optimize site use. More noticeable during peak use, the site requires improvement in the receiving, staging and exit by visitors. Traffic is primarily hindered in the current site configuration because:
 - Insufficient signage and traffic devices are in place to assure traffic flow is consistent. Sight signage poorly communicates information about desired traffic patterns, public recycling procedures, and penalties for certain activities (e.g. fines for illegal dumping).
 - A designated area is not identified at the site for overflow vehicles to park and unload recyclables during times when the area in front of the roll-off containers is occupied by one or more vehicles. This appears to slow customer processing and increases the risk of a vehicle striking another vehicle or a person.

Security

- Without a gated entrance to prohibit and manage vehicular access, liability is increased associated with site assets, visitor safety, etc.

Other

- The bank barn style of building includes an elevated barn floor. The bottoms of the doors on the south side of the barn are approximately 11' above the current roll-off staging area. The elevation change offers an opportunity to use gravity to flow materials down a chute to the south side of the barn. This area could continue to be used to store roll-off containers where the proposed baler may be used to process/bale cardboard (and perhaps other commodities).

6.0 OPERATIONAL RECOMMENDATIONS AND SITE IMPROVEMENTS

The following subsections reflect Gannett Fleming's preliminary opinions regarding the Berks County Recycling Center based on a site visit and information gathered during the course of this evaluation. It is noted that as a general strategy, operational changes and site improvements can and should be conducted in phases, prioritized based on operational needs and cost. As feasible, GF encourages the Authority to pilot test new container configurations, collection methods, or other new operational practices for a designated time period to confirm if the change should be made permanent. Operational flexibility is important, but changing handling methods and procedures that impacts the public use of the site should be limited within reason. **Figure 2** at the end of this Report is a conceptual layout that reflects many of the recommended operational and site improvements.

6.1 Operational Recommendations

GF recommends the following operational modifications:

- **Implement operating cost strategies** – With the findings clear that the cost per pull for recyclables outweighs the revenue potential per load, it is recommended that the Authority align its full cost accounting of the facility to continually evaluate ways to reduce operating costs. Increasing container size, negotiating lower pull fees, requiring material separation, processing/baling are a few strategies to implement. Although market commodity prices are fair and gradually rising, commodity prices are highly variable and add risk to the economic picture – material revenue is only a piece of the ongoing economic analysis of the Recycling Center.
- **Source-separate commingled materials:** Improve the overall management of commingled materials in order to reduce the cost per ton. Source-separate commingled recyclable commodities as feasible to achieve improved program economics. The following streams are possible:
 - Mixed plastics (collected in roll-off or a compactor if compaction is approved). Note: Coughles is testing the use of a compactor for plastics with another client and follow-up with Coughles is recommended to confirm if plastic compaction is feasible for the Recycling Center.
 - Steel cans (roll-off)
 - Aluminum cans (roll-off)
 - Mixed Glass

Note: The final decision on how the commingled stream is separated on site should be based on improving the overall operations, with emphasis on improved economics of the Recycling Center.

- **Modify Recycling Center Configuration for Recyclables:** Utilize the north (upper) and south (lower) side of the facility as follows (see **Figure 2**):
 - North (upper)
 - Electronics
 - Cardboard - Stage a 40-cubic yard roll-off on the upper level floor inside the barn so that cardboard can be dropped off by visitors and then gravity fed down a chute (by Authority staff) into the proposed baler. Partially shut the overhead door onto the top, front edge of the roll-off, effectively directing visitors to enter the roll-off (not the barn) to stack cardboard at the south end of the container to facilitate unload. Modify the entrance around the container so the barn is secure from visitors that arrive after

hours. Add a second door opposite the visitor door to the roll-off so that the container can be opened by Authority staff and unloaded.

- South (lower)
 - Mixed paper
 - Mixed plastics
 - Aluminum cans
 - Steel cans
 - Cardboard baler
 - Cardboard bale storage
- **Procure forklift:** Procure a used forklift in order to safely and efficiently manage skidded materials like electronics and for handling baled recyclables.
- **Confirm baler configuration:** Determining the final design specifications, baler selection, and baler configuration was not within the scope of this study. General baler recommendations include:
 - Validate final baler selection in conjunction with an electrical engineer evaluation of the Recycling Center’s electrical infrastructure to optimize performance with consideration of annual utility/operating costs.
 - Conduct additional evaluation of several potential baler configurations. Notably, the chute to the baler is recommended to be at a minimum slope of 60 degrees of the baler to allow sufficient area adjacent to the baler to store cardboard bales.
 - It is recommended the baler be covered, both to protect the equipment and to allow some protection from the elements when servicing the baler.
 - It is not recommended at this time that the existing pad that is in fair condition be removed and new concrete pad be constructed, which would cost over \$30,000 according to local vendors. However, additional concrete may be necessary if the baler and bale storage area prevents staging recyclable roll-off containers on the existing concrete and brick pad surface.
- **Implement the proposed traffic flow pattern as shown in Figure 2.** This new pattern will increase the cueing distance available to vehicles, limiting the potential for vehicles to back up and encroach Hilltop Road and to generally accumulate on the site. Designate the north access off Hilltop Road as the sole site entrance and utilize the south access as the exit. The traffic flow pattern assumes cardboard drop-off will be relocated to the north side of the facility adjacent to electronics.
- **Designate drop-off areas and vehicle staging or overflow areas** using signage and cones. For example, the gravel “Overflow” area shown in **Figure 2** on the

north side of the facility is recommended so that vehicles can park out of the traffic lane temporarily if needed (e.g. if several other vehicles are loading cardboard or electronics).

- **Use traffic devices:** Store traffic cones on site and use them permanently and/or as needed to direct and restrict traffic as needed.
- **Evaluate Use By Commercial Sector** - Assuming site improvements are completed and with additional cardboard processing capability, it appears feasible that the site could manage a controlled volume of cardboard from the commercial sector. If commercial sector vendors are permitted, it should be done on a trial basis initially. All commercial vendors should be required to register to use the facility. Commercial vendors should not be permitted open access to the site at all times, but should be permitted to use the site only during an identified commercial receiving schedule set by the Authority and/or on an on-call basis.

6.2 Recommended Site Improvements

Paving and Related Site Improvements

- **Paving is recommended as follows in the designated areas shown in Figure 2:**
 - Remove all paving in the proposed designated entrance area.
 - Make a clean saw cut where the proposed area contacts other existing paving.
 - Apply a 4" base course and a 2" wearing course for all proposed paving areas (suitable for periodic truck traffic).
 - In the area where the silos have been removed, a clean saw cut should be made 16" from the edge of the exposed/jagged asphalt. Fill in against the clean edge with 2A aggregate and patch over aggregate. The remaining area inside the silo voids should be leveled with soil and seeded with grass.
 - To eliminate minor slip hazard for visitors, level the gravel area in front of the bay doors prior to paving. Use 2A for leveling for a 10' distance out from the building measuring from the edge of the concrete at the bay door entrances. After 10', taper to existing grade. Pave up to the concrete at the bay doors and other areas as proposed.
- **Apply a 3" high asphalt curb to direct stormwater.** The curb should start at the high point along the clean edge cut around the silo void and continue down along the eastern edge of the facility to the point where existing grades will move stormwater away from the facility.

Proposed Gravel Road

Install a gravel throughway on the northwest side of the Recycling Center as shown in **Figure 2** to optimize one-way site traffic flow and improve cueing distance and traffic safety as follows:

- **The standard minimum 45' turning radius is recommended** for the gravel road assuming periodic tractor trailer use for collecting electronics or bales of cardboard, etc.
- Assure that the area where the proposed gravel road connects with the existing gravel area on the south side of the facility swings wide enough away from the roll-off staging area to give customers room to park and unload.

Concrete Pad

- **Utilize existing pad:** It is not recommended at this time the Authority remove and replace the entire existing concrete and brick pad at the south side of the barn. Expanding the existing pad or should be considered if the configuration of the proposed baler requires additional pad area and/or if the baler reduces the available pad surface and roll-off containers no longer fit on the pad.
- **A concrete pad is recommended beneath the proposed baler, if the final baler location does not have a level concrete surface.**
- Generally, any concrete installed is recommended to have a pad depth of 8" using AASHTO #57 coarse aggregate under the slab.
- Asphalt should not be used as a substitute for pad surfaces for roll-off container or baler staging areas.

Site Entrance and Exit

- **Designate a single north entrance and a single south exit** (see **Figure 2**). Rock barricades, are recommended to prohibit vehicle access on entrances and/or access points along Hilltop road, set back from the road at least one vehicle length. Large rocks are available on site.

Gated Facility

Within the next two years, it is recommended the Authority complete a cost benefit analysis of installing a gated, key card access entrance to the facility. A Key Card Gate Access system is described in Section 2.1.4. A preliminary and approximate location of this possible site feature is noted in **Figure 2**.

Covered Bale Storage Area

There are several locations on the southern edge of Recycling Center that are possible locations to store bales as shown in Figure 3. The Final Baler location, which is not

known now, will be a determining factor on where to store bales. GF's preliminary opinion is to store bales in Bale Storage 1 (Figure 3) because this allows for easy movement of bales out of balers to a location out of the way of other traffic. Bale Storage 1 is a loading dock and its capacity for bale storage (e.g. side by side stacking) should be validated before the area is modified and/or covered as a final bale storage location.

6.3 Recommended Public Communication

The Authority will invest roughly \$150,000 in site modifications and equipment to improve the long term operation of the Recycling Center. Although this money is Recycling Grant funding, this money originates from County residents who pay into a solid waste system that assesses a \$2.00 fee for every ton of waste disposed. The changes to the Recycling Center are necessary to lower operating costs and assure the site is safe for public use. Smart changes will in turn save taxpayers money over time allowing the site to serve County residents in the years to come.

Because site and operational changes will impact the public, likely resulting in some additional sorting of materials, it is critical to inform residents of how and why these changes are necessary. Clear signage at the sight in conjunction with other supplemental education information disseminated to County residents prior to these changes and delivered on an ongoing basis will mitigate negative public feedback. Residents must understand that Recycling Center costs are passed on to them and improving commodity value and making other changes is an overall a benefit to the program.

7.0 CONCLUSION

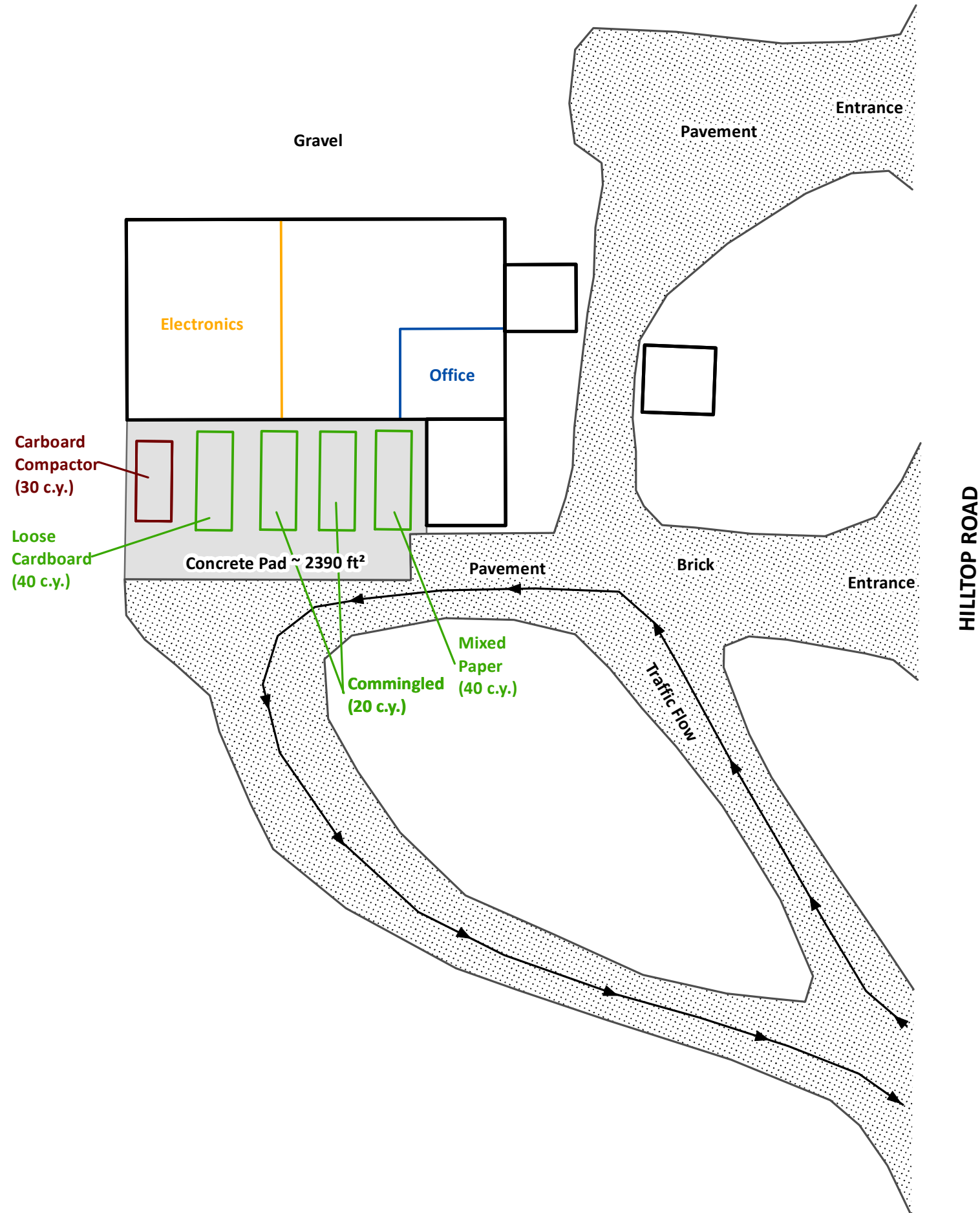
It is clear the Berks County Recycling Center operated by the Berks County Solid Waste Authority (Authority) is continually improving. Based on Gannett Fleming's evaluation, the Recycling Center operates well, but it can be improved. Capital funding from PADEP through the Act 101, Section 902 Recycling Grant will be used for paving and other site improvements and for a horizontal baler for cardboard. GF has made recommendations related to how this funding is applied – focused on improving the overall operational flow and efficiency with emphasis on public and worker safety.

The operating costs can and should be reduced. The Authority should continually analyze operating costs and implement cost-saving operational adjustments. Additional validation is necessary to confirm certain final decisions pertaining to the proposed facility changes. Final baler selection, baler configuration and electrical infrastructure requires additional validation. Paving costs should be quoted by vendors after a site visit to review paving requirements.

FIGURES 1- 4



Field (Leased)



Berks County Recycling Center
Operated by: Berks County Solid Waste Athority

FIGURE 1

EXISTING SITE FEATURES

Site Overview



APRIL 2010

NOTE: Feature locations and sizes are approximate

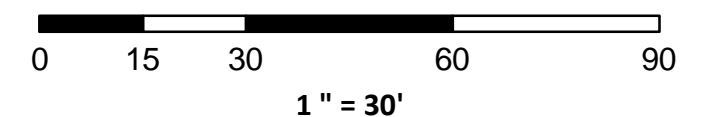


FIGURE 2

PROPOSED SITE FEATURES

Site Overview



APRIL 2010

NOTE: Feature locations and sizes are approximate

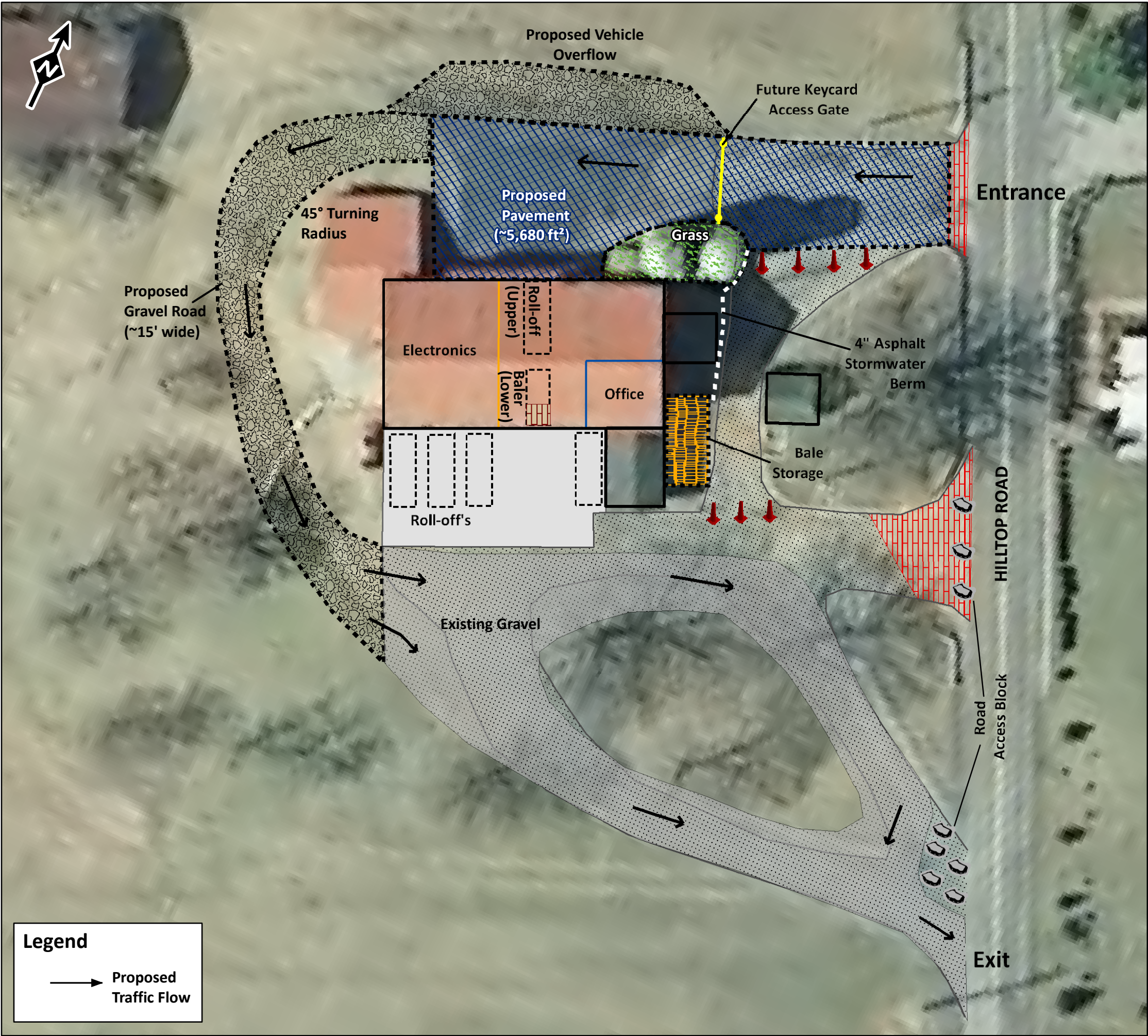
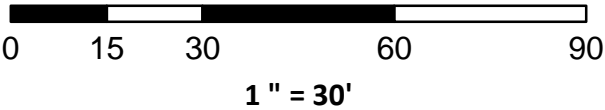


FIGURE 3

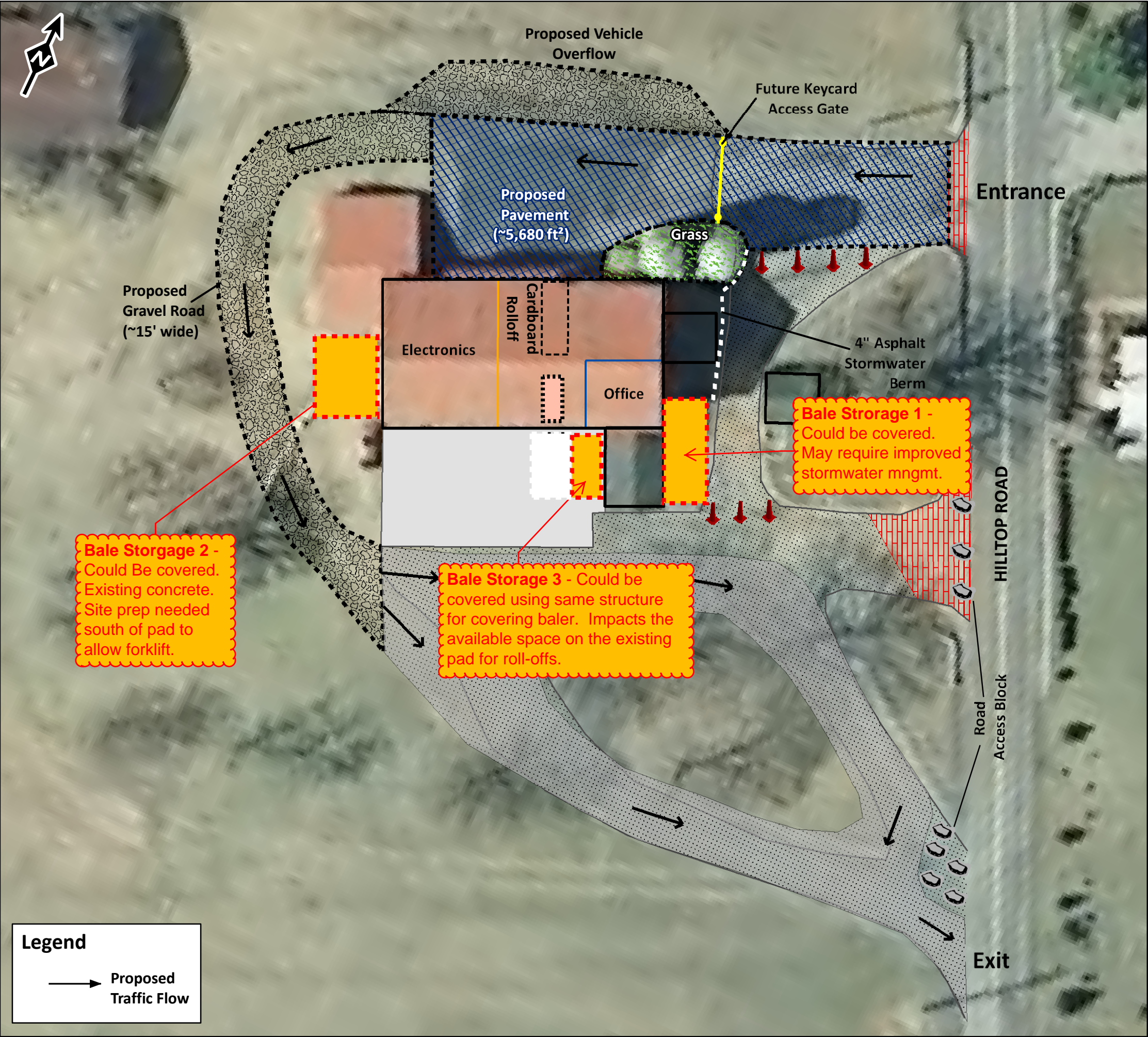
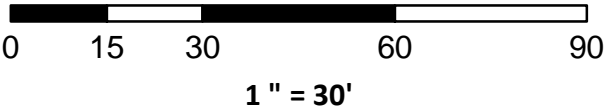
Bale Storage Locations

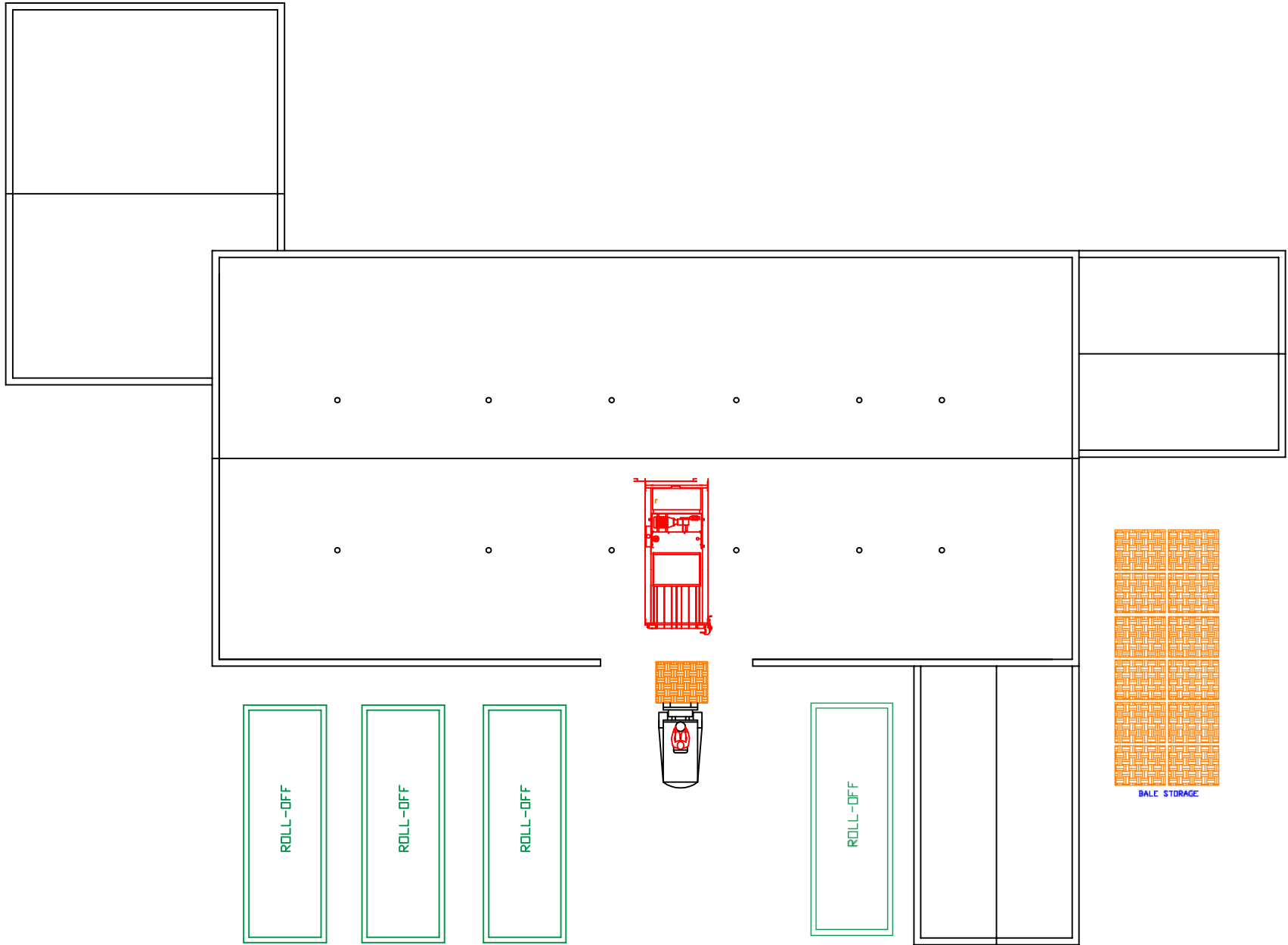
Site Overview



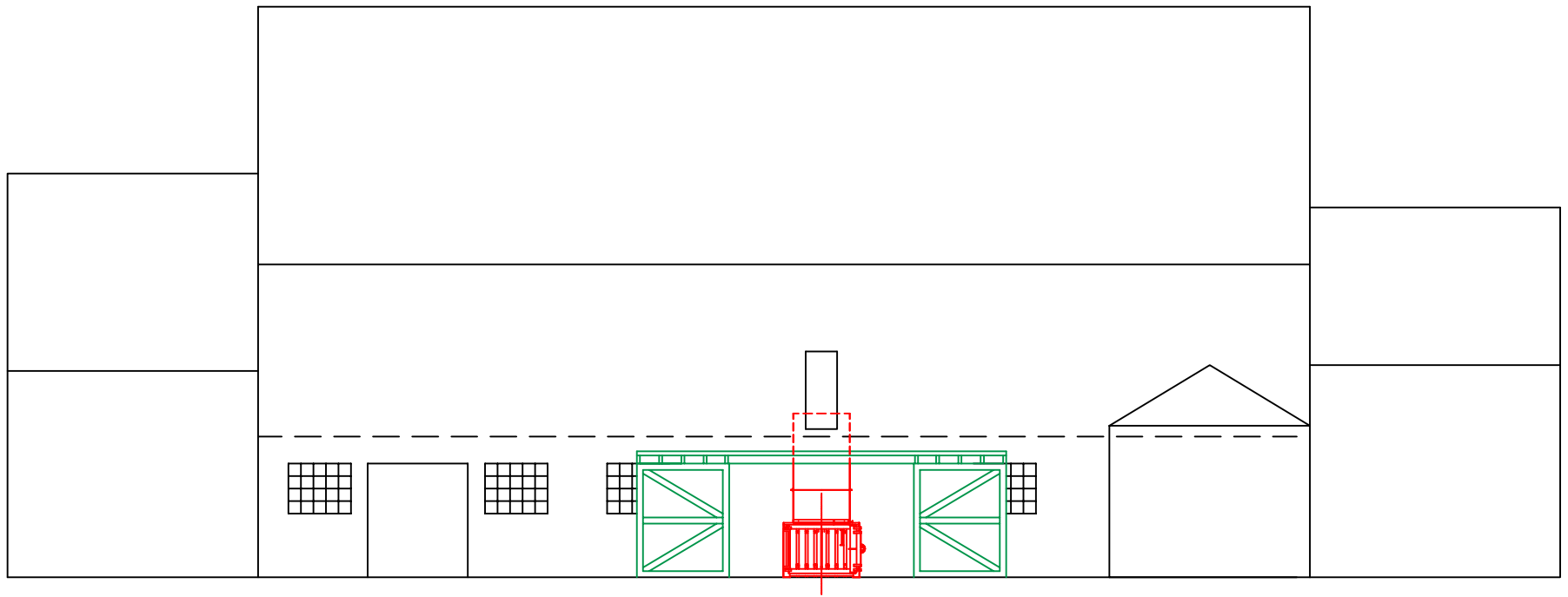
APRIL 2010

NOTE: Feature locations and sizes are approximate





PLAN VIEW



FRONT ELEVATION WITH DOORS OPEN
SHOWING BALER