Transfer Station Operational Evaluation

Lower Merion Township
Department of Public Works
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SCS ENGINEERS

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1 BACKGROUND

The Lower Merion Township Transfer Station (Transfer Station) is part of a multi-use facility serving Lower Merion Township (Township), located at 1300 North Woodbine Avenue. Refuse and recycling collected curbside by the Township is aggregated at the Transfer Station, and it is open to the public for drop-off of materials and mulch pick-up. Residents may drop-off recycling and brush for free, but they must pay a fee to drop off trash. Recycling is collected curbside via a dual stream program on alternating weeks with paper and commingled recyclables collected separately.

In addition to the Refuse and Recycling Division using the Transfer Station, several other Public Works Divisions utilize space on the property. The facility include garages for the Highway and Fleet and Equipment Maintenance Divisions, a salt dome, and a large storage building. The Police and Fire Department also use the property for training activities. The facility has expanded as more Township departments have come to share the space. The use of some aspects of the facility, such as the incinerator and waste pit, have been discontinued, resulting in underutilized space at a facility shared by many departments.

2 SUMMARY OF WORK

This section summarizes the tasks completed for this project.

Task 1 – Site Visit and Program Observations

SCS visited the transfer station and composting facility sites, meeting with Township staff. Program observations allowed SCS staff to understand the Township's concerns and observe existing operations.

Task 2 – Identify Infrastructure and Operational Improvements

Program observations conducted as part of Task 1 formed the basis of the activities for Task 2. For this task, SCS identified and described potential operational changes and improvements that may make waste, recycling, and yard waste processing more efficient, reliable, and cost-effective, and created three potential layouts for the Township to consider.

Task 3 – Final Report

This report includes the research, findings, and results of this study, including the three finalized potential improvements as discussed with the Township.

3 OPERATIONAL AND DESIGN CONSIDERATIONS

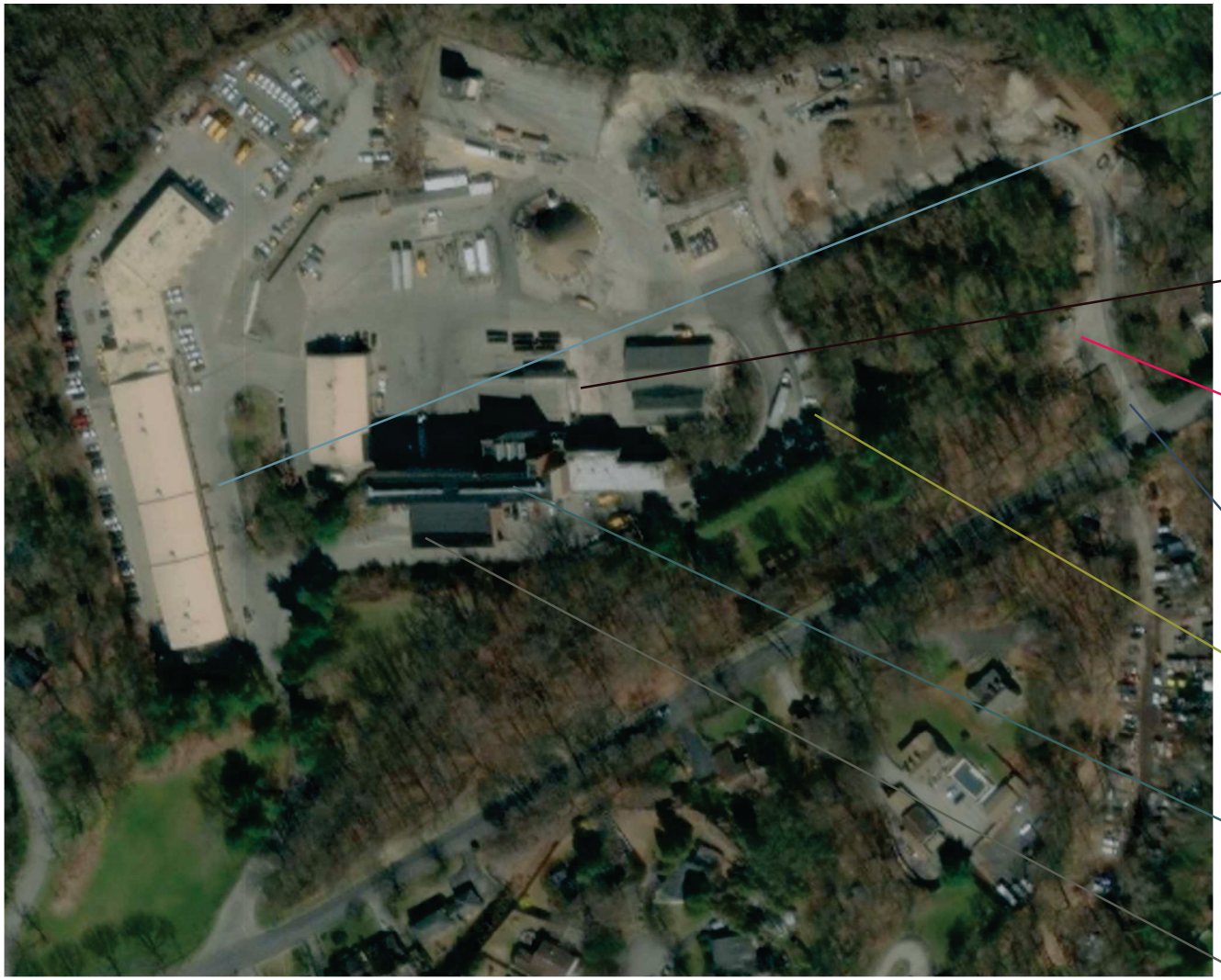
OVERVIEW

As shown in Figure 1, recycling is brought by curbside collection trucks to the ramp behind the incinerator and office building and dumped into open-top roll-off containers. Currently, refuse is brought to the single compactor, where it is compacted and loaded into transfer trucks below. The compactor is located next to a permanently decommissioned pit and crane, which have been out of service for several years. Township personnel expressed an interest for two additional compactors in the area currently occupied by the pit to help with material processing and transfer, specifically recycling. Additionally, the compactor in use for refuse is aging and requires frequent maintenance to continue operating.

Tires, metal, white goods, and other bulky items are accepted at an inner area of the facility, requiring residents to drive past the incinerator building, kennel, parking area, and storage facilities. Yard waste drop-off and mulch pick-up is located beyond the bulky waste drop-off area, near the side entrance to the facility, which is used for trucking mulch to the composting facility.

Problem areas with the facility noted by Township personnel include the ramp used for recycling processing, staff parking, meeting and staff indoor facilities, and traffic patterns. These issues are visually depicted below. An existing layout of site usage is included as Appendix A.

Figure 1. Overview of Transfer Station Challenges



Contractors circumventing payment at scales

Curbside recyclables caught by wind while dumping off retaining wall

Mulch pick-up inconveniently located

Gate kept closed to keep public from improper use of facility

Staff parking requires walking through the site

Underutilized spaces in old incinerator building, historic building, and waste pit

Overall layout difficult for attendant to monitor

POTENTIAL SITE IMPROVEMENTS

Indoor Facilities

–Interior of Incinerator Building

The incinerator building is currently used for indoor storage. SCS believes this space is worth considering redeveloping as a potential conference room or break room for staff. A portion of this space could be sectioned off to provide a break room for employees, while maintaining sufficient space for storage. While visiting the site SCS staff noted that the area underneath the glass ceilings might be particularly welcoming with some cleaning and moderate interior design changes.

The historic building near the police firing range could be refurbished for meetings, offering charm and preservation benefits when hosting departments, the public, or guests. It is close to the office building of the transfer station and along the main traffic route through the facility. Additionally, the yard in front of the building could be developed to provide parking for employees or meeting attendees.

Historic Building

Traffic Patterns

Township personnel noted issues maintaining desired traffic flow throughout the facility due to existing road layout and a lack of striping and unclear signage. SCS noted that traffic for residents and contractors is directed to the road that runs in front of the incinerator and office building, past the scales and attendant building. The roadway along the garages and behind the incinerator and office building are reserved for transfer trucks and staff for other departments. This allows for greater control and separation of traffic flows within the facility. Maintaining this separation is helpful for safety, security, and organizational purposes.

Pavement Striping and Signage

Increasing striping and signage around the facility may help maintain the intended traffic patterns for residents and contractors visiting the site. To indicate desired traffic flow at specific intersections, SCS recommends signs and painted arrows, lines delineating the edges of the driving path, and stop lines and signs to stop or yield for safety. Conversely, the use of "do not enter" or "wrong way" signs could be used to deter drivers from going to undesirable areas. The image to the right shows an example of a convenience center making use of striping and signage for traffic management.

Example pavement striping

Security

Video cameras, and signs showing their presence, at key points in the facility could be useful to help maintain desired traffic patterns; especially in parts of the site where the attendant cannot easily monitor visitors (i.e. the bulky materials drop-off, yard waste drop-off, and mulch pick-up areas). The traffic flow through the secondary access gate to the facility will also benefit from camera monitoring if the facility chooses to use it in the future for a one-way drop-off system. The Township could also consider more stringent security features for drivers attempting to misuse the secondary access road to the site, such as surface-mounted retractable road spikes.

Recycling Infrastructure

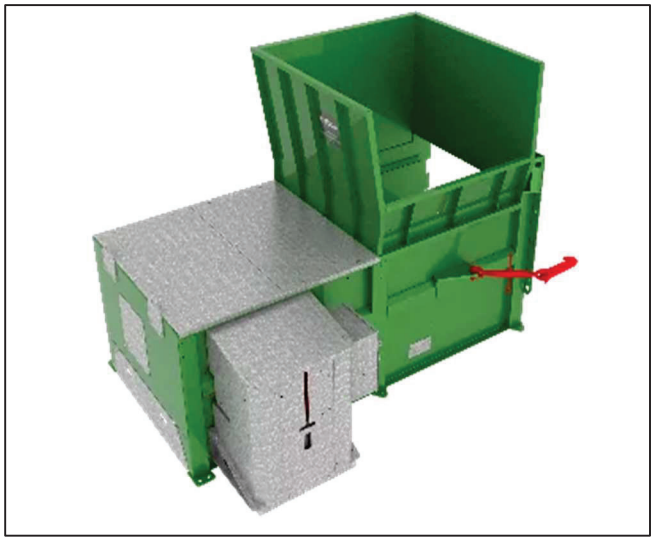
Utilizing compactors for recyclable material management adjacent to the ramp may mitigate the difficulty of curbside collection trucks to get the recyclable materials into the open-top roll-off containers. Compactors typically come with hoppers that guide material into the container, but the Township could also attach hoppers to the open-top containers as a lower-cost option. Two alternative design options to consider may include:

- Enclosing the ramp area with a partially enclosed building
- Move refuse compactor(s) to the ramps and recyclable material management into the transfer station

Adding Additional Compactors

Township personnel noted their interest in installing additional compactors in the pit, next to the existing compactor. This would be a good way to reclaim underutilized space at the facility, resolve the difficulties curbside collection truck operators are having with depositing recyclables off the ramp, and provide flexibility for future growth.

Open bays near compactor



Example open-top loading hopper

Natural areas are available for expansion, but some regrading would be necessary due to the slope by the transfer truck. SCS recommends consulting a structural engineer to modify the waste pit building. Given potential structural issues and the building's age, demolishing it may be a better investment to accommodate new compactors.

Consolidation of Public Facilities

While the current separation of staff and general public traffic is logical, the Township could further collocate public facilities to reduce traffic in areas used by other departments or designated for public works staff. Restricting public access to one area would simplify surveillance and enhance safety by keeping members of the general public away from work vehicles and operations. The current mulch and yard waste disposal areas are the most remote from the scales and attendant and require visitors to drive the furthest into the facility. It may be worth consolidating public access to these services in an area closer to the public refuse, recycling, or bulky material collection areas.

SHORT-TERM PLANNING OPTIONS

Design Principles

Appendix B includes a document that details example solid waste/recycling convenience center design principles that SCS often uses when developing and/or modifying convenience centers that are open to the public. These principles were used to develop concept layouts for potential redesign of the public drop-off areas of the facility, given that SCS' favored changes to the transfer operations appear to require more in-depth investigation and modification to the transfer building.

Option 1

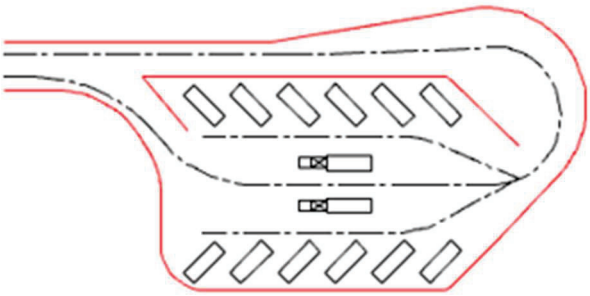
Option 1 focuses on simplifying residential and contractor traffic flow through the site with the least impact to the current layout. The concept layout drawing for Option 1 is included in Appendix C, This option includes one-way traffic flow utilizing the second entrance. Example proposed striping and signage locations are shown to help facilitate this change, and SCS included a sketch of the

renovated historic building as previously discussed. This option may require consideration of the traffic spikes at the second entrance, but the retractability of these spikes would be important to maintain the facility's ability to host its free clean-up weekends.

Option 2

Option 2 focuses on condensing the areas accessed by public users to keep them closer to the office building and scales. The concept layout in Appendix D shows mulch pick-up and yard waste adjacent to the turn-around, which is behind the bulky materials area. This would eliminate the need for the public to drive to the eastern part of the site where yard waste processing, snow storage, and other materials storage are located. Utilizing the existing turn-around behind the bulky materials area eliminates the need to use the second entrance. This new flow pattern is delineated by example pavement striping and signage on the concept layout.

Option 2 also includes further development of the old firing range in front of the historic building. This area is already flat, making it relatively easy to develop and pave for additional capacity for recyclables drop-off or bulky materials, should the Township want to provide additional capacity for any of those material streams in the future. SCS' preferred model consists of angled access to roll-off containers and two-lane compactor access in similar open spaces. It is also conveniently located near the office building and scales, along the proposed traffic flow path. Although not drawn, the Township could consider moving access to all public services, including yard waste drop-off and mulch pickup into the area, dependent upon space needs and willingness to move the yard waste to the back of the site internally.



–Example of preferred convenience center layout (see Appendix B for more examples)

Please note that the schematics developed for this study are concept-level only. The Township should consider conducting a travel path model with specific vehicles and a thorough review of state and local safety/traffic guidelines before implementing these changes.

4 LONG-TERM PLANNING/CONCLUSION

Township personnel described the ad hoc nature of site expansion and the problems the lack of a master plan for the site has caused. Improved planning for the future would help to alleviate these issues. SCS recommends developing a master plan with drawing layouts based on studies such as this, investigations by structural engineers, and financial models for the capital investments.

Future considerations for the site allow for more flexibility in planning. Township personnel noted cracking on one of the garages on site. This building, the incinerator, and the crane are thus potential demolition spaces, leaving an empty space in the case of the garage and incinerator. As the incinerator is integrated with the office and refuse processing building, it is logical that any future use of this space would also be for refuse or recycling. However, the garage location has much more potential. Depending on the needs of the Highway and Fleet Divisions, a replacement garage could be located on more stable ground where large goods, mulch, and brush are currently located. The secondary access could become the general Public Works entrance, leaving the main entrance for public access. Then, mulch, brush, and large goods could take the place of the current garage. This

would place them immediately to the left when entering the facility, making them easy to monitor and access.

In the meantime, the Township may consider adjustments to the traffic flow of the facility using the Option 1 or 2 layouts in this report as a jumping-off point. Overall, however, SCS found the Lower Merion Township Transfer Station to be a well-run facility with very few of the issues we find at similar facilities, like insufficient queuing space, internal traffic conflicts, or too little materials processing capacity. The Township has plenty of developed space to consider rearranging waste handling, especially if it can find ways to store equipment and materials belonging to other departments more efficiently.

Appendix A
Existing Layout

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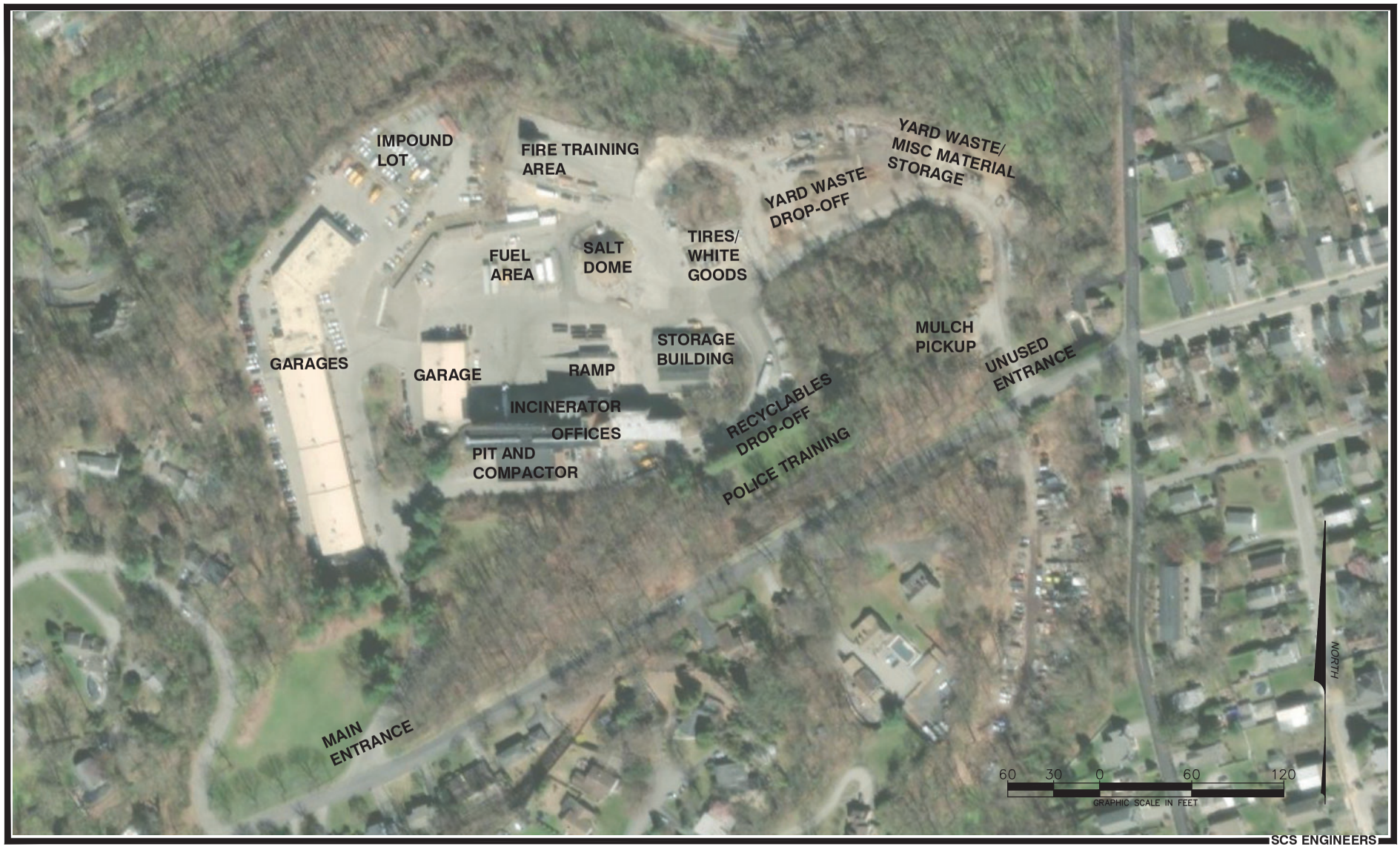


EXISTING LAYOUT

Appendix B
Convenience Center Example Design Principles

CITIZENS' SOLID WASTE/RECYCLING CONVENIENCE CENTER EXAMPLE DESIGN PRINCIPLES

This document summarizes general recommendations that Lower Merion Township may consider utilizing if it is interested in reconfiguring or updating existing citizens' convenience centers or designing new ones. SCS uses these principles as a guide for our convenience center design projects across the Mid-Atlantic region of the US.

Layout

Container Placement

If space allows, collection center containers should be arranged in a staggered formation to maximize the number of citizens able to effectively utilize the facilities at any one time. This should be accomplished by designing with implied, if not delineated, parking areas adjacent to the space surrounding the containers. Containers should be placed with convenience and ease of use in mind. Materials which should be placed in close proximity are listed below:

- Mixed paper and OCC (Old Corrugated Containers).
- Plastics, Glass, Aluminum Cans, and Steel/Tin Cans.
- Common bagged household waste (Compactor containers) and bulky solid waste.
- Bulky solid waste and scrap metal/appliances.

The collection center containers and other interior features should allow aisle clearance of at least 4 feet from any retaining wall, fence, embankment, or other raised edge. To discourage unauthorized use, any attendant structure should be well-positioned to observe and enforce the rules of the site. Care should be given to use containers that limit the possibility for windblown litter and that allow easy and ergonomic disposal to the most senior of County residents. In addition, the placement of compactors or other frequently serviced containers should be made with ease of hauler approach and swap-out/removal in mind.

Bulky waste collection containers as well as other standard roll-offs are recommended to be situated upon fixed guiderails to prolong the useful life of each box. While this reduces container placement flexibility, it is becoming standard practice for convenience center infrastructure and can at least be installed for permanently positioned containers.

Expandability and Flexibility

Space should be incorporated into the design to allow for future expandability and flexibility of the site should additional collections containers for new or existing (if quantities increase enough to warrant it) material streams be necessary.

Signage considerations include longevity as well as flexibility; County policies, materials accepted, and the manner of material collection may change over time.

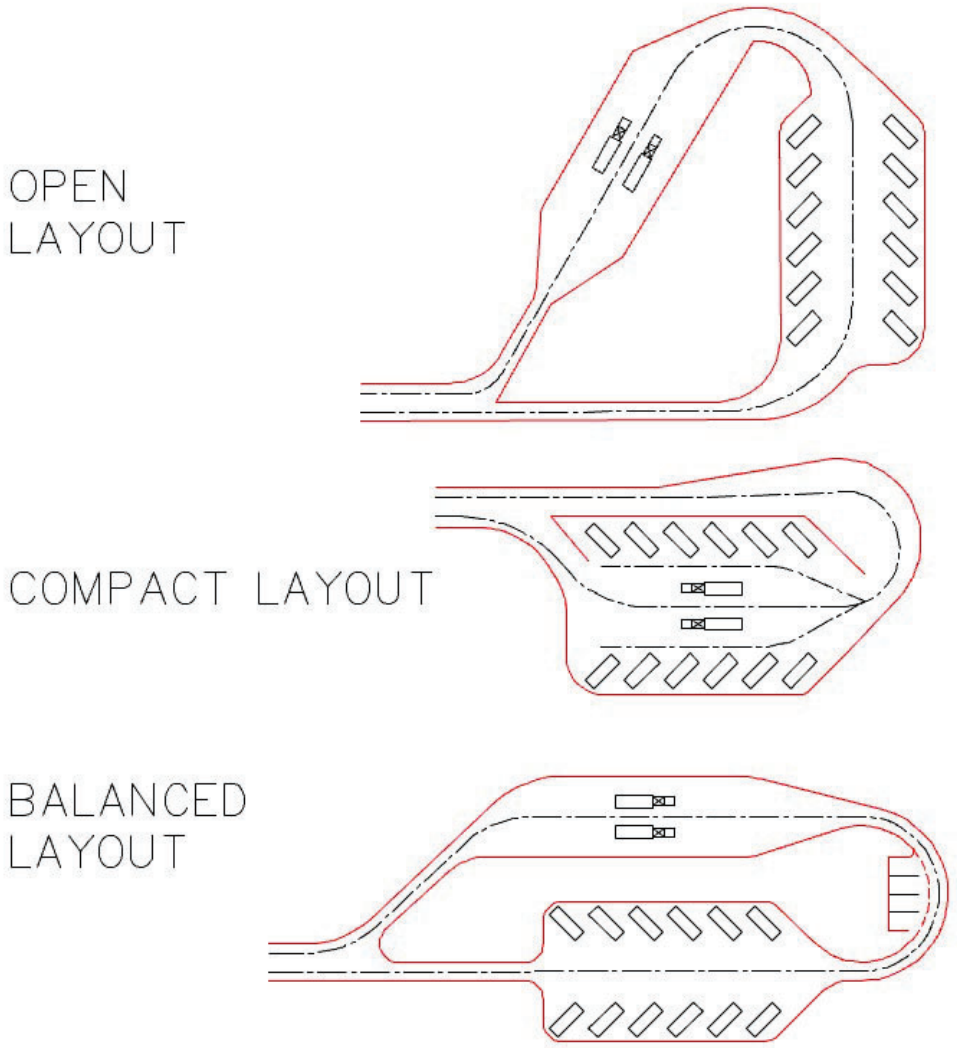
Traffic Flow

Safe and efficient traffic flow is a critical consideration for the design and development of a convenience center. Important aspects of traffic flow to consider include the following:

- The centers should be sized to accommodate the expected traffic load at peak utilization (typically midday on Saturdays). The size of the centers should be at a minimum sufficient to meet the current expected peak loads, and ideally for the future as well. Traffic load may be established through a field study and/or utilization of GIS data.

- The most desired traffic flow format for each new and redesigned center from a traffic flow perspective is a counterclockwise loop with an entrance separate from the exit. This flow format is not always feasible given budgetary or physical site constraints, so a "lollipop" loop with a commercial entrance wide enough to accommodate both entering and exiting traffic is another option. In general, having more queuing space increases traffic capacity, which can be directly related to the degree of compactness of the centers, ranging from a highly compact layout to a more open layout. Three example formats of collection center layouts, all of which utilize a counterclockwise traffic flow direction, are shown in **Figure B-1** below to demonstrate potential degrees of compactness.

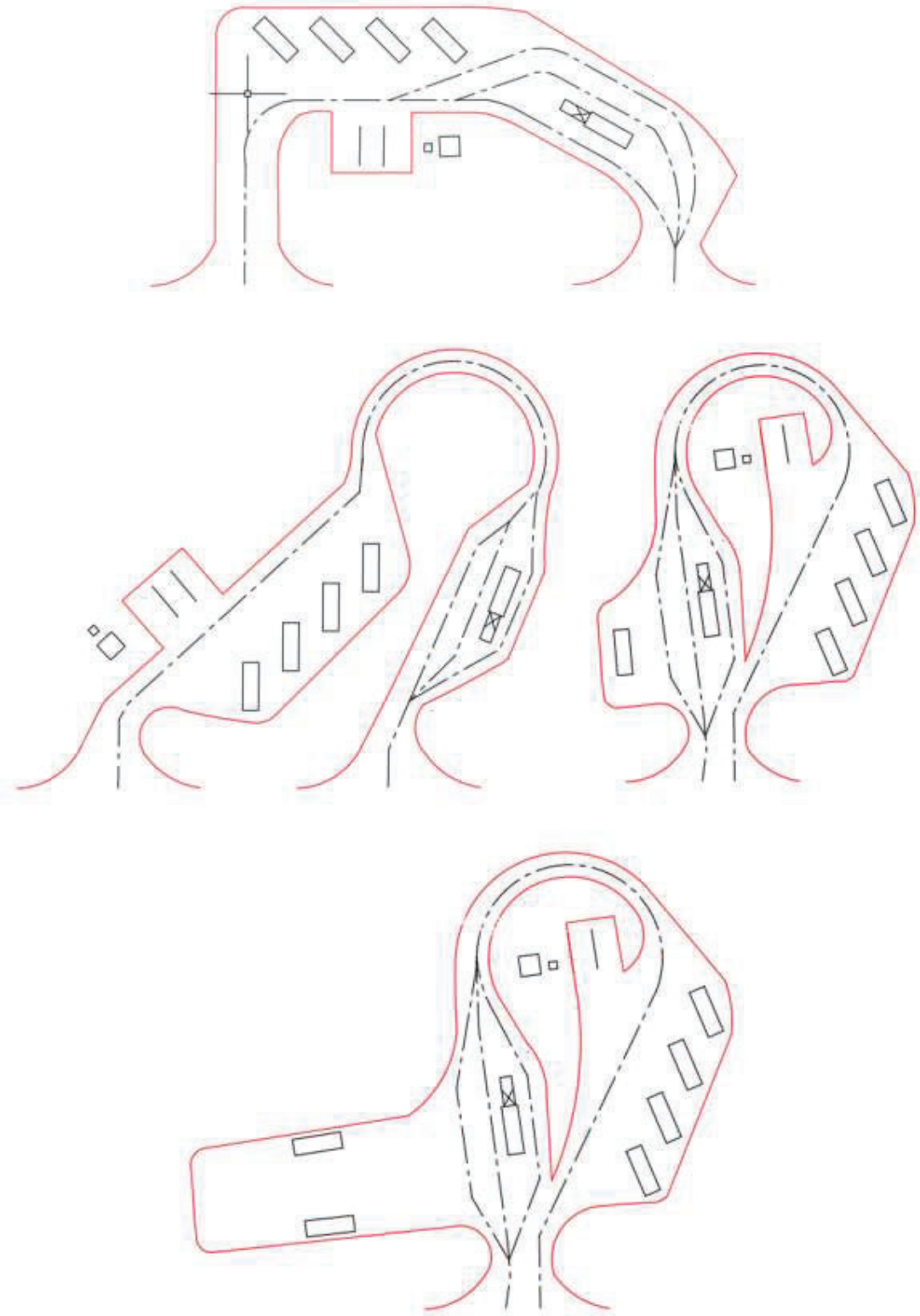
Figure B-1. Example Layouts of Potential Collection Centers



The Open Layout allows for maximum traffic queuing and usable space, but because of its area, requires the most site work and land disturbance. The Compact Layout minimizes the impacted area of construction but does not allow for much queuing. This Balanced Layout allows some queuing space, a central island area for the attendant and/or green space, and reduced land disturbance as compared to the Open Layout. This layout enables high levels of traffic flow while guiding collection center users in a deliberate manner throughout the site. Note these sketches represent sites with a very high level of service and capacity and the designs may be consolidated/tweaked according to actual needs.

Additional potential layouts are shown in **Figure B-2** below.

Figure B-2. Example Layouts of Potential Collection Centers



Signage

Signage located at the County collection facilities should ensure visibility, clarity, and overall effectiveness. It is critical that a consistent messaging program is employed to deter citizens from discarding incorrect materials and avoid other types of confusion. Signs are a great tool in combination with direction to drivers communicated by pavement striping.

Consistency can also be established with branding – this is also an essential part of any effort that injects modern themes of environmental stewardship, including adding new materials streams or recycling policies.

Security, Safety, and Aesthetics

Security, safety, and aesthetics are additional considerations that should be taken into account during the development of Neighborhood collection center layouts/configurations.

Safety

The safety and comfort of collection center users, attendants, and contractors is paramount.

- Safety features for users:
  - If stepladders or stairs are used to give residents easier access to dumpsters, they should always be implemented with the potential for injury in mind. These features should include guardrails for stability, and they should provide adequate grip for both the feet and hands to reduce the potential for slips, trips, and falls.
  - Signage directing traffic in the proper direction should be employed to avoid congestion and potential accidents.
  - Only the collection center attendant should be allowed to cycle compactor boxes. Boxes should be key-operated; Lock Out/Tag Out measures should be employed and the compactor key should be removed from the machine after each completed compaction cycle.

- Safety and comfort features for attendants:
  - A prefabricated, electrically wired attendant shed should be located on-site and heated/cooled according to the outside temperature. In addition, it should be equipped with an attendant cell phone for communication with contractors and other County staff and stocked with drinking water at all times.
  - The attendant house should be implemented in such a way to avoid the costs and engineering requirements associated with a constructed footing. Prefabricated buildings could avoid this extra cost.
  - A portable toilet primarily for attendant use should be located at each collection center and serviced regularly.

- Safety features for County/contracted haulers and other non-attendant personnel:
  - County staff or contractors servicing the collection sites by performing duties such as emptying full containers, making repairs, spreading gravel, or performing other potentially disruptive work should make an effort to do so during off-peak traffic hours if possible (beginning and end of the day).
  - Potential conflict between low-lying overhead utility lines or other obstructions and roll-off trucks should be avoided through engineering controls during the design phase and good operational practices.

- Other safety features:
  - A speed limit of 10 mph should be set and prominently displayed on a sign to reduce the risk of accidents in all collection centers.
  - Clear, bright striping and/or reflective surfaces/coloration should be used where a point of contact between collection center infrastructure and vehicles may occur.
  - A minimum of two concrete filled 6-inch I.D. steel pipe bollards or horizontal concrete bumpers should be placed on each side of all on-grade compactor boxes, and possibly also roll-off containers as well.
  - Adequate lighting should be provided to reduce shadows and dark areas in and around the collection site. Lighting fixtures should be installed with power efficiency in mind; however, it is also important to consider the aesthetic nature of the lighting for consideration of neighbors. Lighting should only be provided from dusk to dawn to reduce electrical costs except during hours of operations in which additional lighting is necessary for the safety of collection center users.
  - All road/embankment washouts, potholes, damaged infrastructure (such as containers, fencing etc.), and other obstructions should be dealt with promptly upon their discovery.

Security

Fencing should form a complete perimeter around the centers and be able to be secured with restricted access to prevent unauthorized intruders, human and otherwise. A heavy-duty padlock should be employed to lock the gate each evening at the collection center. Additionally, a locking mechanism should be employed on the attendant shed during hours of closure. The collection of items for which there is an assessed fee is discouraged. Requiring collection center attendants to make monetary transactions would require the accumulation of cash and may be a safety issue.

A closed-circuit camera should be positioned so the collection center is in full view of the recording device to capture any potential unauthorized activity on film. At a minimum, a faux camera can deter intruders without incurring significant up-front expense or recurring operating costs.

Aesthetics

In an age of frequent and very public expressions of “Not in My Backyard” (NIMBY) sentiment, it is desirable to make aesthetic considerations a priority for convenience centers. SCS believes that in addition to good security, convenience center fencing, gating, landscape screening, and other features should provide an aesthetic acceptable to the surrounding community’s standards. The compactor site shown in **Exhibit B-1** is an example of an existing collection center that has taken intentional efforts to incorporate aesthetic considerations via the planting of screen trees.

Exhibit B-1. Example of Screen Trees Around Existing Compactor Site

Ideally all waste and recycling collection areas are screened from view by an opaque fence as well as planted landscaping elements. Fencing screen height should extend at least 1 foot above the tallest container or structure within the collection center, with a minimum height of 7 feet, and landscaping/horticultural elements should be expected to well exceed the fence height upon their maturity.

Convenience centers should avoid institutional, industrial, or heavy-commercial elements that would detract from the overall residential nature of their surrounding communities. Specific elements to avoid may include barbed wire, metallic chain-link fencing, and rusty or damaged containers. Using green chain link fencing delivers an increase in aesthetic quality over plain metal fencing. The maintenance of landscaping shrubbery and other features can go a long way in improving the look of the full-service Centers; it is important to consider upkeep of these features as a recurring expense.

Material Stream-Specific Recommendations

Solid Waste

Bulky Waste Collection: Certain brands of compactors may be able to be substituted for open-top waste collection containers which can accommodate larger materials that normally could not be

compacted. This would allow for greatly increased efficiencies and a higher resident throughput during peak traffic hours.

Recyclable Material

Operators may consider purchasing compactors exclusively for the most heavily utilized material containers. This can increase the density of collected material, make a more efficient use of space, and reduce the number of container pulls needed for this material.

Yard Waste and Other Organics

Operators should require citizens to tarp loads of yard waste to reduce the chances of debris going airborne on the way to the collection center or upon arrival at the convenience center.

Additional Material Categories

- Items for Reuse: Still-usable discarded item collection sheds may be incorporated into the design of the convenience center. If items for reuse are collected, a covered and at least partially enclosed storage area should be incorporated into the collection center design. It is recommended that the storage area be completely enclosed in a fenced cage to prevent theft of items by individuals who may wish to hop the perimeter fence to obtain things of value. The enclosed space should be protected from the elements and signage should be included at the collection location which prohibits broken or unclean materials from being dropped off. Any additional guidelines for reused material drop-off should be prominently displayed with large font and clear language.

- Libraries: The Regional sites will offer the same amenities as Neighborhood sites.

- Electronic Waste and Batteries: SCS has noticed some increase in allotting space for “hot loads”, where vehicles that may ignite due to items such as Lithium batteries can be directed to extinguish the fire and/or wait for assistance away from the center of the site.

- Construction and Demolition (C&D) Debris: This material can be more easily compacted when segregated from standard trash and can be processed through the removal of salable metals more easily.

Appendix C
Option 1 Concept Layout (One-way Traffic)

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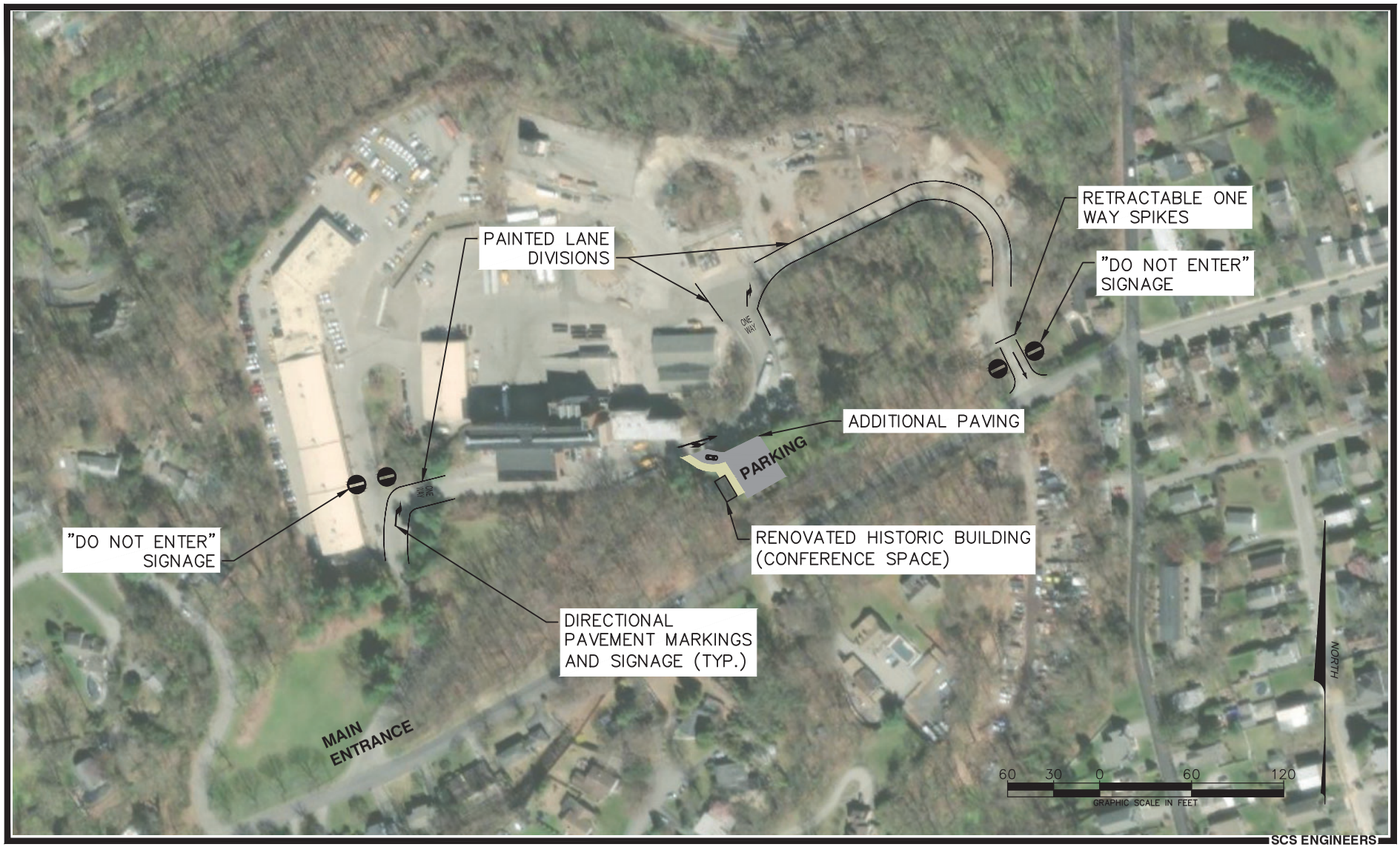

CONCEPT LAYOUT CHANGE - OPTION 1

Appendix D
Option 2 Concept Layout (One-way loop with developed firing range)

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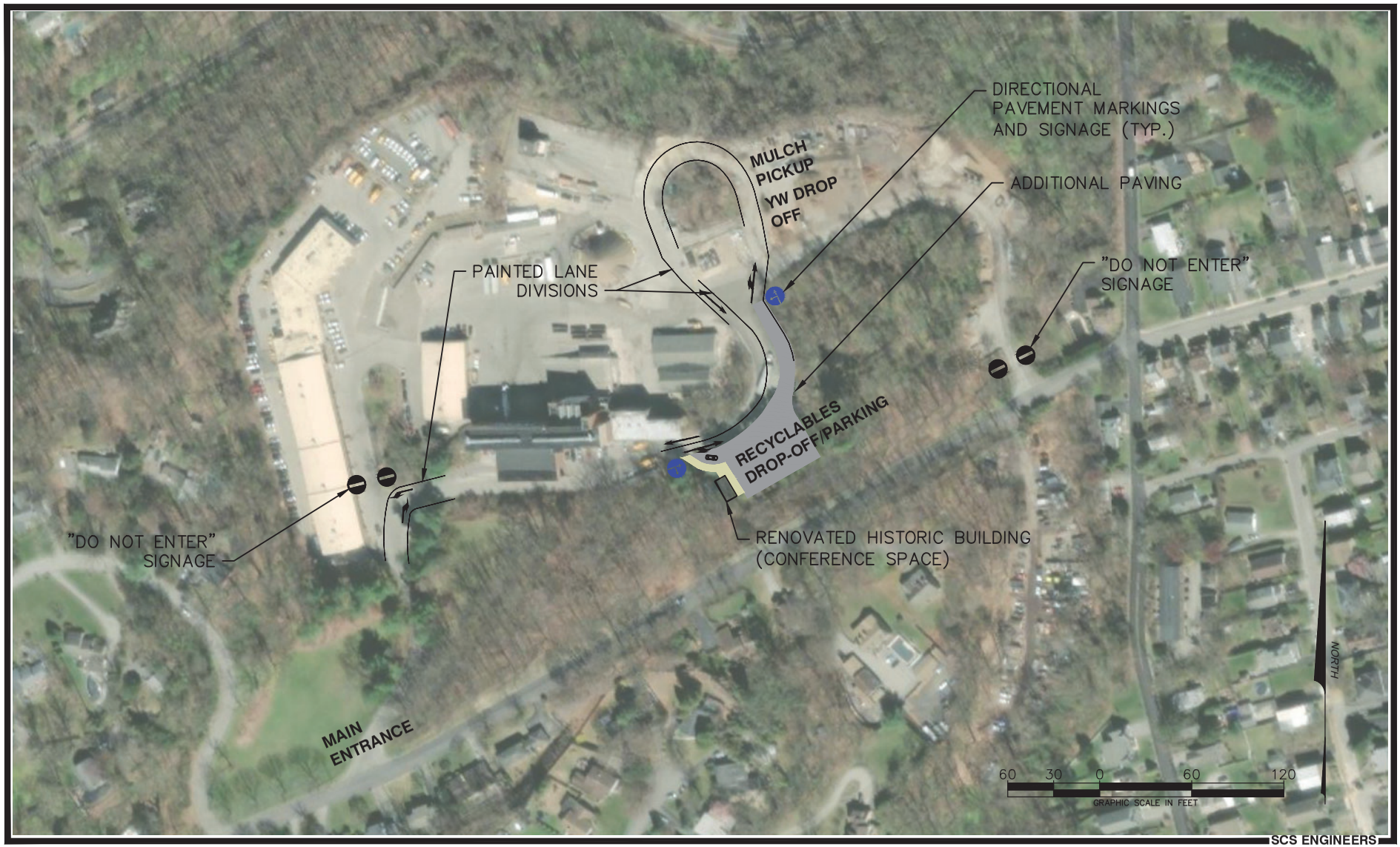

CONCEPT LAYOUT CHANGE - OPTION 2