Transfer Station Shed No. 3 Preliminary Engineering Report

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SCS ENGINEERS

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1.0 INTRODUCTION

SCS Engineers, PC (SCS) presents this Transfer Station Shed No. 3 (Facility) Preliminary Engineering Report (PER) for the Henderson County Engineering Department as part of the County's capital planning activities.

The PER documents the development and discussion process performed for following tasks:

- Task 1 Kick-off Meeting and Workshop
- Task 2 Layout Options Analysis
- Task 3 Preferred Layout Option Development
- Task 4 Stakeholder Meeting and Feedback Solicitation
- Task 5 Construction Cost Estimate
- Task 6 Permitting and Development Schedule
- Task 7 Final Report

2.0 OBJECTIVE

The primary goal for the PER was to developing a preliminary site layout for Shed No. 3 that could be used to estimate construction costs for budgetary planning purposes. We understand it is the County's long-term plan to create this necessary waste management infrastructure to best serve the needs of the citizens of Henderson County.

3.0 BACKGROUND

The County's Transfer Station, located at 191 Transfer Station Drive off Stoney Mountain Rd, is composed of two existing transfer buildings (Shed 1 and the older Shed 2), overflow areas, and special material handling areas. Materials collected, consolidated, and hauled for final disposal include municipal solid waste (MSW), construction and demolition debris (CDD), recyclables, and special wastes. The transfer facility is a key component of overall Solid Waste Division operations. The Division's other operations are integrated with the transfer operation at Stoney Mountain to provide the critical solid waste and recyclable material management services in an environmentally sound manner. Thusly, other service lines and operations were also considered as part of this Study to develop the PER in a holistic manner.

3.1 CO-LOCATED FACILITIES

The transfer station is co-located with other facilities including the closed County MSW and CDD Landfills, two independent scale areas, a Citizen's Convenience Center, and various material storage and processing areas. In addition, an older building referred to as the Solid Waste Center (Center) is located immediately south of the transfer buildings. The Center serves as an office for administrative functions of the Solid Waste Division. The County-owned property used for solid waste management activities sits on 137 acres and is adjacent to the County School Bus Garage owned by Henderson County Public Schools (Bus Facility), a NCDOT operations lot, and assorted other properties, many of which are individual residences (see also Section 2 "Review of Existing Services" in **Appendix A**).

3.2 TRANSFER STATION CAPITAL IMPROVEMENTS PLAN

According to the County's current Solid Waste Management Plan (SWMP), in 2020 the Stoney Mountain Rd facility accommodated nearly 800 vehicles per day on average and accepted about 113,400 tons per year of MSW and CDD waste, the majority of which was transferred at one of the two existing transfer sheds. Since that time, the amount of waste managed increased. Due to larger waste volumes, the County has planned the construction and expansion of transfer operations into a third shed or further mentioned as Shed No. 3

The planned future expansion of the existing Transfer Station facility will allow the County to continue to serve its constituents through sound MSW management practices as it grows in population. The 2020 SWMP indicates the development of a third transfer station shed at the Bus Facility in FY 2023 for CIP purposes.

3.3 **BUS FACILITY DEVELOPMENTS**

The tentative location identified previously for Shed No. 3 is the Bus Maintenance Garage adjacent to the existing transfer facility. The Bus Facility parcel is not directly connected to the County solid waste management facilities; it is accessed via an existing driveway off Stony Mountain Rd, near the solid waste facility entrance. The new transfer station building was anticipated to be sited at the soon-to-be former location of the Bus Garage site. The dedicated transfer area for residential use only is envisioned to speed up transactions at the main scalehouse and allow commercial customers to better utilize the existing transfer sheds as well as the WasteWizard automated scale system.

SCS considered the Bus Facility parcel in the site location analysis. A map of select existing services is included in **Appendix B-1**.

4.0 PRELIMINARY DESIGN CRITERIA

A kickoff meeting and workshop attended by SCS and County representatives was held at the onset of the project to discuss preliminary design criteria and other factors to consider during the PER. Minutes for the kickoff are included as **Appendix A**.

The meeting and subsequent discussions guided the formation of initial design criteria. These design criteria made up the preliminary basis for design and include various elements:

- potential site locations
- service lines
- capacity required based on waste acceptance projections
- potential site development restrictions
- and other considerations.

These factors, detailed below, were the primary influencers of the technical design criteria for the concept layout drafted in Task 3 and the budgetary estimate of capital costs for Shed No. 3.

4.1 SITE LOCATION ANALYSIS

Based on the kick-off meeting, SCS considered the following areas for the potential location of the new transfer station shed as follows. **Appendix B-2** presents the potential areas in relation to the Stoney Mountain Rd. Solid Waste Facility.

- Area 1: This area on the eastern side of the convenience center and closed CDD landfill unit appeared too costly to develop for a transfer station, particularly given the uncertainties of permitting requirements and other factors associated with building heavy infrastructure on old waste units. The County also sought to avoid potential locations near existing residential areas, and portions of Area 1 were in close proximity to residences. This area is zoned R1 (Residential One), unlike the other two areas presented below.
- Area 2: This area is the site of the current Solid Waste Center, a building with offices that was previously known as the Stoney Mountain Activity Center. This site is relatively flat in grade but slopes downward to the south and Stoney Mountain Rd. It is proximate to the existing transfer sheds, scale systems, trailer storage areas and other facilities. The existing grade slopes, immediately behind the existing transfer station sheds. A third transfer station could potentially be located on this grade to use the same tunnel access as that for the current sheds. A potential configuration for the third shed and possibly even a fourth would be to mirror the new shed(s) from the existing, using existing site features to reduce costs and keep transfer operations consolidated.

The Center will need to be demolished for development of a transfer shed at this location. Employees use the Center as an office, but an alternate location for employee administration and break activities could be sited at Area 3 if it is acquired by the Solid Waste Division. This area is zoned LC (Local Commercial).

• Area 3: This area is the site of the school system's Bus Maintenance Garage. This was the site initially identified by the County for Shed No. 3 and is located on a County-owned parcel.

If this site were used, the existing maintenance building would need to be removed. SCS also conducted a setback and constructability analysis of this area, which revealed the portion of the site available for construction of Shed No. 3 was limited due to various factors:

- setback restrictions from existing NCDOT Right of Ways,
- the presence of a cemetery plot on the north end of the site, and,
- the presence of a marked waterway on the east side of the site which would restrict the connectivity of the location with the existing transfer station.

SCS conducted a site walk of Area 3.

SCS discussed various siting criteria concerning Area 3 with NCDEQ representatives to clarify several issues, including the landfill facility boundary location, requirements of special waste handling, and Right of Way buffer clarifications. The following presents the results of these discussions:

- <u>Facility Boundary:</u> The landfill facility boundary shown in the 2013 site map is current. If the permitted site is expanded (i.e. to include the Bus Facility parcel), the County will need to submit a permit modification showing a revised facility boundary.
- <u>Special Uses</u>: Regarding potential for using the Bus Facility parcel as tires and/or TVs receiving area, empty trailer storage, and/or yard debris storage, NCDEQ stated that "non-solid waste activities" could be located here (empty trailer storage) if the parcel is outside the landfill facility boundary. Other solid waste activities would need to be within the landfill facility boundary. SCS confirmed solid waste handling could not occur outside the facility boundary; however, operations not involving solid waste such as storage of empty trailers was an acceptable use.

• <u>RoW Setbacks</u>: NCDEQ indicated the transfer station would need to be 100 feet off the NCDOT ROW per new state transfer station regulations (off Stoney Mountain Rd).

Exhibit 1 below demonstrates the setbacks assessed for Area 3. SCS conducted a site walk of Area 3. This area is also zoned LC. County planning setbacks include 150 feet buffer from Stoney Mountain Road.



Exhibit 1. Area 3 Potential Setbacks

• Off-site Areas: Areas outside the vicinity of the Stoney Mountain facility were not explored due to various factors. It was deemed unlikely that a greenfield site located elsewhere in the County would be beneficial for overall Solid Waste Division operations, or even achievable given the additional siting, permitting, and financial implications. The locations in the vicinity of the Stoney Mountain Road facility are each relatively accessible and central to both the population centers of Henderson County and Solid Waste Division operations.

4.2 LOCAL REQUIREMENTS REVIEW

Exhibit 2 below indicates the current transfer station parcel as well as Areas 2 and 3 are zoned Local Commercial (LC). Area 3 is shown outlined in red in the exhibit for reference.



Exhibit 2. Area Zoning

County zoning requirements for LC districts are shown below in Exhibit 3.

Table 2.7. LC Density a	nd Dimension	al Requiremen	ts	
(1) Pasidantial Dansity (4			
(1) Residential Density (units/acte)	(3) Maximum	16	
Maximum Impervious St	80			
(4) Maximum Floor Area	30,000 or 10,000			
		Local	10	
	Front or ROW	Collector	10	
		Thoroughfare	20	
(A) Vard Sathacks (foot)		Boulevard	30	
(4) Taro Selbacks (Teer)		Expressway	40	
		Freeway	45	
	Side		10	
	Rear		10	
(5) Maximum Height (fee	40			

Exhibit 3.	LC Zoning Requirements
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The maximum height allowed in the LC district is 40 feet, which could require a variance given typical transfer stations generally exceed that height. In addition, since the site is anticipated to be owned and occupied solely by the County, the maximum gross floor area may be restricted to 10,000 square feet, the maximum for a single tenant in an LC zone. The County may have to apply for a

variance to be excluded from these requirements. **Exhibit 4** below indicates the special use requirements for County owned and operated solid waste facilities such as Shed No. 3.

Exhibit 4. Solid Waste Facility Zoning Requirements

SR 9.	.11. Solid Waste Facility, County Owned/Operated
1. 2.	Site Plan. Major Site Plan required in accordance with §42-330 (Major Site Plan Review). Lighting. Adequate lighting shall be placed in areas used for vehicular/pedestrian access including, but not limited to: stairs, sidewalks, crosswalks, intersections, or changes in grade. Lighting mitigation required.
3.	Dust Reduction. Unpaved roads, travelways and/or parking areas shall be treated to prevent dust from adverse affects to adjacent properties
4.	Security. The operations of a waste collection and transfer facility shall be totally enclosed by: (1) a security fence at least eight (8) feet in height; (2) a wall at least eight (8) feet in height; or (3) a fireproof <i>building</i> . Entrances and exits should be secured and locked during near secure barries being the secured and locked during the secure barries being the secure of the secure
5.	Perimeter Setback. One hundred and fifty (150) feet from a residential zoning district. Necessary ingress and egress to the proposed use (s) may be located within the perimeter setback.
6.	Perimeter Buffer. A B2 buffer as described in Article V (Landscape Design Standards), Subpart A (Buffer Requirements) is required around the perimeter boundary of the site, the operational area(s), or any combination thereof. Preserved existing trees may be credited toward the required buffer.
7.	Sedimentation Control. Permanent control measures are required to retain all non-compacted soils on site.
8.	Operations. Where feasible, debris reduction methods such as chipping and mulching (using

Operations. Where feasible, debris reduction methods such as chipping and mulching (using portable equipment) shall be utilized to reduce the amount of debris permanently withheld on site.

4.3 SITING OPTIONS MATRIX

As described above, SCS investigated possibly site locations including the Bus Facility site and alternatives. Following the kickoff meeting and related subsequent discussions, SCS developed a siting options matrix for comparison purposes presented in **Appendix C**.

Area 2 was identified as the preferred site by the County to continue investigating.

4.3.1 Operational Siting Factors.

Other general siting factors were assessed for the PER, specifically for Area 2.

Service Lines

The County indicated that the primary customers to be served by proposed Shed No. 3 are residents who typically hand-unload their waste materials from their vehicles, as well as small ("mom and pop") haulers whose vehicles are not equipped with a hydraulic dumping system. These customers are anticipated to be segregated from larger commercial customers (aka "haulers") with larger vehicles generally equipped with hydraulic dump systems. The segregation of these customers is anticipated to not only increase operational efficiency of the transfer operations, but also enhance the overall customer safety and experience. In addition, the length of time required for unloading residential loads tends to be longer than commercial due to the lack of hydraulic dump vehicles

Ingress/Egress and Traffic Flows

Residential and commercial customers, transfer trailers, and employee personal vehicles are all anticipated to primarily access Shed No. 3 via the current main entrance/primary scales road. This road connects to Stoney Mountain Rd on the west side of the Bus Facility parcel. Currently, all collection/transfer vehicles and personal vehicles also exit the site via this main road, which has two lanes in each direction. All customer vehicles are required to cross scales when entering and leaving

the facility, although many commercial customers alternatively use the Waste Wizard automated system located to the south and west of the existing transfer station. This system allows frequent users of the transfer station to input a unique vehicle identification code to weigh in so they may bypass the main scales and exit scales weigh-in on the return trip (vehicle tare weights are stored by vehicle).

Sufficient queuing distance on the main road and any new access roads will be required so that vehicles do not block traffic internally or on roads neighboring the Facility during peak operating hours. Since the space required per residential vehicle relative to waste load size can be high due to the nature of residential loads, conceptual level queuing analysis was performed to assess the queuing space estimated to be needed.

Traffic patterns and vehicle flows, assuming an Area 2 site location, were explored by the County to assess the feasibility of siting Shed No. 3 just south of the existing sheds (see **Appendix A** exhibits). The potential traffic pattern allows segregation of residential and hauler traffic, assuming use of the gravel access road on the perimeter of the special materials collection area to the east of Shed #2. It was deemed feasible to integrate Shed No. 3 with existing operations if it were to be located south and mirrored to existing Shed #2.

4.3.2 Other Factors.

Aesthetics

Conforming to any required setbacks, Shed No. 3 will be positioned at a distance from property lines so as to reduce offsite visibility. During site development, clearing of vegetation may be kept to a minimum to enhance site aesthetics. Adhering to best practices to reduce the potential for light/noise pollution or odors beyond site property lines will mitigate impact to offsite receptors.

Modern transfer stations are often designed to conform to the character of the surrounding community. Ground surfaces surrounding the Facility can be appropriately landscaped. In addition, trees, shrubbery, flowers and other foliage may be planted as both natural screening and to control erosion.

Wherever it is ultimately located, unauthorized access to the Facility may be restricted with a security fence which can double as a screening mechanism in select areas visible to the public. Additionally, a line of planted or retained landscaping trees may be added to visually buffer the Facility.

Stormwater Management

Stormwater run-off from the proposed Facility may be conveyed to existing or new stormwater management features, referred to as Best Management Practices (BMPs), via open channels (dry swales), culverts, pipes, or a combination of conveyance features/infrastructure. Structures such as bioretention areas or sand filters could be required if permitting authorities deem the Facility will warrant additional runoff quantity or quality controls. Other stormwater practices may include disconnected roof run-off, meaning that run-off from the main Facility building's roof will be discharged to grassed or forested areas. Although not within the scope of this PER, it is recommended that stormwater quantity and quality measures required should be investigated thoroughly during the design/permitting phase.

Other Site Improvements

Available utilities will vary depending on site selection. Area 2 may require relocation of the electric utilities. Other considerations include wastewater management systems and conveyances, development of staff restrooms (i.e. sewage management) if needed, building utilities required and

availability at existing site, security, and site interconnectivity, whether for site personnel vehicles, operational equipment such as the front loader(s) or pedestrians.

5.0 PRELIMINARY CONCEPTUAL DESIGN

SCS used the preceding findings to prepare preliminary conceptual layout drawings for Shed No. 3. Conceptual drawings were developed in two phases as shown below:

- **Preliminary Layouts:** Transfer building (layout only, generic to location) sized based on the design criteria and superimposed for reference on a site aerial at two different potential locations in Area 2.
- **Conceptual Design:** After selecting the preferred preliminary layout location, SCS refined the design to incorporate additional aspects such as future expansion capability, topography, site improvements, and earthwork.

5.1 PRELIMINARY LAYOUTS

Development of the preliminary layouts was facilitated by a collaborative process between SCS and County staff. During this process, preliminary design aspects for Shed No, 3 were discussed including key operational aspects, sizing considerations, and desired structural features.

5.1.1 Key Operational Aspects

Discussions with the County indicated the general methods and flow of current transfer operations were desired to be applied to Shed No. 3, with few minor adjustments. Key operational aspects can vary considerably by transfer station. The following operational considerations were discussed during the PER and were critical to development of Shed No. 3 preliminary design components.

Push Pit and Lift and Load Methods of Transfer

Two distinct methods for loading transfer trailers are typically implemented at facilities similar to Henderson County's: a "push pit" system similar to what is used in the existing sheds, or an "open-top loading" system using the lift and load method. For smaller facilities, the lift and load method, using a front-end loader lifting against a knee wall for extra compaction, can be cost effective and eliminates the need for an open pit in the floor of the transfer station. However, the push pit method works well for certain facility conditions. Given the topography of Area 2 and current practices at the existing sheds, the push pit method was deemed appropriate. For operational consistency, the Shed #3 preliminary layout was designed with an open push pit similar to those in Sheds 1 and 2.

Temporary Floor Storage

SCS' design experience with transfer stations has identified that the most cost-effective and operationally-efficient facilities provide appropriate floor storage for waste. Floor storage refers to the area onto which unloaded material is placed temporarily. It is then later moved to the transfer trailer by a front-end loader or similar equipment. This process enables a reduction in queuing time since the solid waste collection vehicles can enter the facility and unload more waste, leveraging economies of scale and acting more quickly for the given amount stored. This strategy also allows customers to continue to unload when bridging (container opening "damming") or other loading issues occur, when in-trailer compaction is performed, or when transfer trailers are unavailable.

In addition, proper floor storage facilitates throughput by allowing time for sorting, mixing, or compacting waste prior to directing it to the pushwalls of the station or into a surge pit for loading. When implemented correctly, these design options effectively utilize floor storage to reduce queuing times and increase operational efficiency. In addition, efficiencies can be gained through increased waste storage capacity during times of peak waste acceptance using temporary pushwalls or surge pits. This may increase the payloads of the trailers and reduces the number of trailers needed.

5.1.2 Sizing

A 20-year design life of the Facility was assumed for sizing purposes based on projections of current waste quantity data into future operating years. The estimated material quantities for Years 1 to 20 (corresponding to CY 2025 through 2044) are presented in **Exhibit 5** below.

Percent o	f MSW/CDD Waste to Bay #3 (Residential)	38.4%	(Calc. from County data)		
Percent P	opulation Growth Factor (Per Year)	2.3%			
Percent W	/aste Growth Assumed (Per Year)	2.3%			
Voor No	Voor	Quantity Projected (Tons)			
rear NO.	fear	Monthly Average	Annually		
NA	2021	3,707	44,488		
NA	2022	3,793	45,511		
NA	2023	3,880	46,558		
NA	2024	3,969	47,629		
1	2025	4,060	48,724		
2	2026	4,154	49,845		
3	2027	4,249	50,992		
4	2028	4,347	52,164		
5	2029	4,447	53,364		
6	2030	4,549	54,592		
7	2031	4,654	55,847		
8	2032	4,761	57,132		
9	2033	4,870	58,446		
10	2034	4,982	59,790		
11	2035	5,097	61,165		
12	2036	5,214	62,572		
13	2037	5,334	64,011		
14	2038	5,457	65,483		
15	2039	5,582	66,989		
16	2040	5,711	68,530		
17	2041	5,842	70,106		
18	2042	5,977	71,719		
19	2043	6,114	73,368		
20	2044	6,255	75,056		
	Maximum (20-Year Design)	6,255	75,056		
	Design Waste Quantity (Tons/day)		240		

Exhibit 5. Conceptual Design Waste Quantities Projected

Calculations to assess the size of the Shed No. 3 tipping floor were based on projected solid waste quantities accepted from residential customers, which was assumed to be all customers not classified as "haulers". Key assumptions and summary narrative are presented below; a narrative memo and calculation worksheets are presented in **Appendix D**.

- Hours/Days of Operation: 7:00 am 4:00 pm (9 hours per day), 6 days per week.
- Design Capacity: Calculated for Year 20 peak waste throughput quantities
- Number of Bays: 1
- Delivered Waste Density: 400 pounds per cubic yard on the floor.
- **Temporary Tipping Floor Storage:** ¹/₄ of a day on peak day of week.
- Maximum Storage Pile Height (maximum at center of pile): 8 feet.
- Tunnel Type: Full depth.
- Other Criteria:
 - Front-end loader utilized in the lift and load method to load transfer trailers as currently performed at Sheds 1 and 2.
 - Solid waste management areas (unloading spaces, tipping floor, and loadout space) allow for flexible adjustments of floor areas accommodate anticipated changing material streams over time.
 - Transfer trailers enter Facility for loading using in-line transfer trailer tunnel (no backing required).

5.1.3 Structural Features

Key components of a solid waste transfer station are the building's tipping floor, push walls, tunnel, and select other structural features.

Full-Depth vs. Partial Depth Tunnel

The transfer station tunnel (the tractor trailer throughway and loading area) format can impact costs and operations significantly. The primary decisions for preliminary design is the selection of full-depth tunnel design versus partial-depth as well as the selection of an in-line or back-in tunnel.

The loadout tunnel was assumed to be full-depth, similar to the existing sheds. Facilities with fulldepth tunnels are typically used if there is adequate grade drop available for their construction. Given the topography of Area 2, this was assumed to be the case. The conceptual difference between partial depth tunnels and full depth tunnels is presented in **Exhibit 6** below. Full depth tunnels allow waste to be pushed directly into the trailer if the pit incorporates an appropriately sized hopper to prevent spillage and bridging of material.



Exhibit 6. Types of Transfer Trailer Tunnels

Full depth tunnels typically require 14 to 15 feet of grade differential, which often is achieved through excavation. Construction of a cinder block wall and concrete pillars are necessary for support on the transfer station side of the tunnel to enhance the structure.

An in-line tunnel design allocates enough space for only one trailer to pass through the tunnel at a time. In many facilities, this results in trailer trucks having to drive a loop around the entire facility

property in order to allow the truck behind it to pass. For the preliminary building layout, it was assumed the pit would accommodate one trailer to load at a time, and that an exterior bypass lane as is currently available at the existing sheds would be utilized.

An alternative would be to integrate an offset tunnel design, which allows enough space for one trailer to pass by the other within the same tunnel. This leads to greater efficiencies in operations for larger facilities with limited exterior space, but it also adds significant costs for the additional space during the capital phase of the project. An offset tunnel design was deemed unnecessary for the Facility.

Tipping Floor

The tipping floor of the Facility building is assumed to be a slab reinforced for relatively harsh tipping activities on the entire interior footprint within the pushwalls. The floor is conceptually divided into areas including the unloading positions, unloaded material storage area, loader turning space, load out space, and buffer space. The floor is preliminarily sized to accommodate storage space for up to one quarter of peak day of week solid waste throughput.

Push Walls/Loading Mechanism

A wheeled front end loader similar to what is used at the existing sheds will likely be used to compact and form storage piles for waste, compact (via tamping) waste once loaded into the trailer, and reduce noise in the enclosed space (relative to tracked loaders). SCS discussed with the County the potential for a crane (either on a ceiling track or fixed on the transfer floor) for use in the new Facility, and it was deemed unlikely to benefit operations relative to the current front-loading method.

As such, an 8-foot high push wall was assumed to be positioned along the edge of the tipping floor on all walls between the unloaded material space and pit. The front-end loader will utilize the push wall to compact waste and form storage piles, which should be high enough to form reasonably high storage piles.

Building Ingress/Egress

Transfer buildings are typically constructed using a metal frame and one or more bay entrances. Entrances are generally open, as is the case for the existing sheds, or use metal roll-up doors. Entrance and exit doors are often not placed in-line in order to enhance collection vehicle traffic flow through the building, increase safety, and limit wind tunnel effect (which limits the escape of dust/debris and odors). Space between the entrance and exit doors is allocated for collection vehicles to maneuver and back into position for unloading onto the tipping floor.

As currently neither of the existing sheds have offset ingress/egress (both Sheds 1 and 2 are accessed solely from the open front side), SCS worked closely with the County to explore preliminary design of a side entrance, which according to transfer station personnel operating similar facilities to what Henderson County needs, also facilitates an improved residential drop-off experience. A roll up door was assumed for the cost estimate for this side entrance only.

5.1.4 Initial Building Sizing Calculations

An estimated design capacity and other design criteria were used for Shed No. 3 sizing calculations, which assumed a preliminary design similar to the existing sheds.

A depth of 25 feet for unloading vehicle positions plus dumping space was included. In addition to these areas, 62 feet of floor depth is included for loader turning space and loadout space (combined, where the front-end loader equipment maneuvers), and additional buffer space. Currently, it is common practice for the loader to frequently back in and out of the existing sheds and

maneuver outside the building. Results of the sizing calculations include a total 87 feet of depth from the facility entrance to the front of the open pit. The open pit is 6 feet in width and 45 feet wide, and is presumed to be at the back of the floor area. A 4.5-foot corridor around the three interior sides of the tipping floor area was included.

The total depth of the floor is thus 93 feet and the total length of the building is 97.5 feet. The preliminary layout includes an inherent contingency that in the worst-case scenario (excessive waste backing up on the tipping floor storage area), vehicles may be positioned at the edge of the tipping floor to dump as long as unloaded waste is contained to the slab and drainage system.

The length of the trailer loadout tunnel is approximately 71 feet, same as the width of the building. The width of the tunnel is about 9 feet and the height of the tunnel area is 15.5 feet in elevation from the tunnel grade (approximate 2197.5 feet elevation based on the GIS topo) to the FFE (approximately 2213 feet). The sum of these various designated areas yields a total building length of approximately 245 feet. The tipping area (including the open pit and push walls) totals 5,580 square feet. With the 4.5-foot perimeter corridor, the footprint of the building was assumed to be approximately 7,000 square feet.

5.1.5 Preliminary Building Layouts

Using the above sizing considerations, preliminary Shed No. 3 layouts were developed as shown in **Appendix E-1** and **E-2**.

5.2 PREFERRED LAYOUT DESIGN

SCS expanded the layout drawing to include grading and other conceptual design activities to integrate the building layout into the northernmost location in **Appendix E-1**. This location was deemed preferred for the following reasons:

- This location allows the mirroring of Shed 2 and smooth continuity of many current operations, including operation of the current trailer storage and bypass lane;
- The location should allow relatively straightforward integration of existing transfer station liquids management facilities, such as the grit chamber, stormwater infrastructure, wastewater conveyances, and possibly other facilities such as the municipal sewer system;
- The northern location and identified access will facilitate segregation of its users from haulers and other transfer station activities; and,
- The location allows for future expansion of a future Shed 4 along its south side by mirroring existing Shed 1 immediately to the south across the trailer bypass lane.

Figures developed for the preferred layout design are presented in **Appendices F-1 and F-2**, final layout and grading drawings, respectively.

5.2.1 Site Layout Considerations

Due to the high degree of uncertainty associated with future site reconfigurations, the preliminary building layout drawing was largely limited to the building and grading (with limited tunnel, retaining wall, and entrance driveway concept development). However, several key site layout considerations including queuing capacity, site traffic patterns, and employee facilities are explored below.

Vehicle Queuing Capacity

Queuing distance capacity is a critical requirement of heavily-trafficked facilities and is generally modeled as a function of expected arriving vehicles during a peak traffic hour. Queuing distance calculations for the Facility are included in **Appendix D**, which estimate 2,075 feet of queuing capacity required in the Year 20 design year during the most heavily trafficked day of the week (Saturdays).

The queuing capacity requires at least one of the following conditions will occur at the Stoney Mountain Rd complex:

- 1. **Peak Traffic Day Customer Restrictions:** Transfer station access on peak traffic days (Saturdays) via the main entrance road (Transfer Station Rd) will be limited to residential and non-hauler customers only, and all of these users will be directed to the third shed. Haulers will be segregated to the area of the Waste Wizard and Sheds 1 and 2 and will use a dedicated entrance off Stoney Mountain Rd.
- 2. Use of Overflow Areas: As is currently practiced to reduce traffic backups, residential and other non-hauler users are distributed via directive at the scale house to various available overflow facilities for unloading, including Shed 1, Shed 2, and auxiliary transfer station waste drop off locations.
- 3. Additional Transfer Station Expansion: A fourth shed will be constructed to increase unloading capacity when deemed necessary to address growing material quantities accepted, vehicle storage needs or general congestion/backups.

The inbound lanes of Transfer Station Rd combined with site roads near the current special waste handling area were verified to total at least 2,075 feet in length when combined. As the preliminary conceptual layout was developed without deeply exploring broad site reconfigurations and future operational practices are highly unknown, this queuing analysis is highly speculative.

Site Roads and Traffic Patterns

Traffic may generally circulate around the site in a counter-clockwise (CCW) direction. Design considerations for traffic flow included those for residential and other non-hauler vehicles using Shed No. 3 and the transfer vehicles servicing it.

Radii for transfer trailers tunnel lane ingress and egress were assigned to be at least a 30-foot to accommodate the larger vehicles and their increased turning area required. Given the placement of Shed No. 3, earthwork behind the existing sheds will be required, estimated to be approximately 5,000 CY of cut and 300 CY of fill (an additional 1,000 CY of cut was estimated for access roads and front pad area, but preliminary grading was not performed for these areas). Approximately 9,500 square feet (sf) of new asphalt adjacent to the current trailer by bypass area was estimated and 4,300 sf of asphalt of existing graveled areas near the special waste acceptance was estimated for additional access road length for the third shed. In addition, a 6,500-sf rectangular, concrete operating area on the exterior the Shed No. 3 was assumed as an extension to the covered area of the shed, similar to what is present for the existing sheds.

Site clearing, grading, and demolition of conflicting existing structures will take place prior to construction to improve Area 2. Gravel site roads for use by residents are assumed to be paved with asphalt based on an appropriate NCDOT standard pavement section. A portion of the tunnel, assumed to be the areas where the tractor trailers start and stop, is assumed to be paved with

concrete due to increased impacts. In addition, a dedicated scales for the tunnel was assumed in the budgetary cost estimate.

Employee Facilities and Personal Vehicles

Currently, Stoney Mountain Rd facility employees generally park on the east and south sides of the Center. Construction of Shed No. 3 in Area 2 may impact employee parking.

In the future, if the Area 3 parcel is transferred to the Solid Waste Division, employee personal vehicle parking and other facilities may be relocated to one of the several existing buildings in Area 3. Potential employee facilities include offices, a wash room, lockers, break room, etc.

Facility employees could enter the Area 3 site and avoid the scales via the outside bypass lane.

Not included in the concept design or cost estimate are discretionary Facility features such as employee bathrooms/offices and education and outreach (E&O) features such as viewing windows or protected stadium seating/standing areas for tour groups.

Hauler Vehicles

Hauler vehicles transporting solid waste enter the Stoney Mountain Rd complex along Transfer Station Rd through either the main scales lane or a bypass lane to the Waste Wizard system as shown below:

- 1. **Main Scales:** After weighing at the primary scales, vehicles proceed directly to either Shed 1 or Shed 2, then turn around in line with an open unloading position, back into position, and dump waste onto the tipping floor. These vehicles bear right to exit the site the way they came by the primary scales via the designated outbound lane (and weigh out on the outbound scales if needed).
- 2. Waste Wizard: After bypassing the primary scales, vehicles bear right and proceed to the Waste Wizard loop, which is offered to haulers as a self-service weigh-in method via keyed entry of unique identification codes. After entering their ID, haulers weigh-in on dedicated Waste Wizard scales, then pull up to the front of either Shed 1 or Shed 2, back into position, dump waste onto the tipping floor. These vehicles bear right by the primary scales to exit via the designated outbound lane (and weigh out on the outbound scales if needed).

The siting of Shed No. 3 may be an opportune time for the County to initiate conversations with NCDOT to potentially add a second site entrance off Stoney Mountain Rd. The entrance could potentially be hauler-only and one-way to best utilize available queuing space and facilitate efficiency of traffic flow and operations

Exhibit 7 shows the location of this potential site entrance, which is a former entrance to the Solid Waste Division facility closed after the redevelopment of Transfer Station Rd and the installation of the main scales.



Exhibit 7. Potential Dedicated Hauler Entrance Off Stoney Mountain Rd

Transfer Trailers

Transfer trailers will use the same procedures as currently practices, as the preliminary conceptual design assumes the general trailer flow remains the same after the development of Shed No. 3 (as well as Shed No. 4 potentially).

5.2.2 Miscellaneous Considerations

The safety and comfort of users, operators, contractors, and surrounding neighbors is key to a welloperating facility. Strategies for facilitating user traffic flow should be used to avoid congestion and incidents/accidents. In addition, consideration of employee and contractor needs will help facilitate long-term operational efficiency and effectiveness.

User Features:

- Clear, bright striping and/or reflective coloration should be used wherever a possible point of contact between Facility 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 critical infrastructure and be set in concrete footings a minimum of 2 feet in depth.
- A speed limit of no more than 10 mph should be set and prominently displayed on a sign leading to the site to reduce the risk of on-site accidents. Additional signage should limit what users can or cannot do within the transfer building.
- 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 as well as effectiveness for illuminating problem spots in mind.
- All road/embankment washouts, potholes, damaged infrastructure (such as curbing, fencing etc.), and other obstructions should be dealt with promptly upon their discovery.
- Users who repeatedly disobey directional signage should be dealt with accordingly. Only Facility operators should be allowed past the stop lines designating the limit of material dumping.

Features for County Staff and Contractors:

- The facility should be well-ventilated and heated/cooled according to outside temperature.
- County policy regarding operator assistance of Facility users should be visited prior to the commencement of Facility operations.
- The building entrance and exit should be offset (not located in-line on opposite sides of the Facility) to decrease the "wind-tunnel effect" and other issues often experienced at facilities that do not account for this factor during design.
- Contractors and other users servicing their vehicles should endeavor to do so in designated areas and during off-peak hours if possible (beginning and end of the day).
- Potential conflict between low-lying overhead utility lines or other structures and tipping trucks should be avoided through engineering controls during the design phase.

General:

- All materials remaining at the facility at the close of operations each day will be contained within the enclosed material recovery area of the facility. All operations should be in accordance with the Facility's operations manual.
- Dust generation will be minimized through paving where feasible and maintaining roadways in addition to conducting reduction activities indoors thought watering of dry areas.
- Wind-blown debris will be controlled since all unloading, reduction, and loading operations take place within an enclosed building. Hauling vehicles entering the site and all transfer trailers leaving the site will be required under current state law to utilize adequate covers or other means of containing the material being hauled.
- Personnel will regularly monitor the Facility grounds.

6.0 BUDGETARY COST ESTIMATE

SCS developed an engineer's preliminary/budgetary opinion of estimated construction cost for the Shed No. 3. In addition to site development and construction costs, the estimate includes select operational equipment, such as a front loader and scales, and miscellaneous services associated with the project, such as engineering and surveying during construction. See **Appendix G** for the budgetary estimate, which was estimated as being just under \$4 million.

As unit prices for construction line items were obtained from RS Means as presented for CY 2021, SCS inflated unit prices with a 7% inflation factor (IF) to obtain costs in terms of 2022 dollars.

7.0 **PERMITTING CONSIDERATIONS**

All North Carolina applicable solid waste facilities, including solid waste transfer stations, require a permit from the North Carolina Department of Environmental Quality (NCDEQ). This includes the construction and operation of a solid waste management facility for the acceptance, handling, and transferring of MSW as defined in NC General Statute 130A or the NC Administrative Code Title 15A Subchapter 13B. After review and approval, the NC Division of Waste Management, Solid Waste Section, issues the permit. Amendments or modifications fees are also assessed in addition to an annual renewal fee, and if sited in Area 2, it is likely only an amendment to the existing transfer station permit (Permit No. 4504T-TRANSFER-1998) would be required.

Permits are issued for the life-of-site (LOS), which refers to the period from the initial receipt of solid waste at the facility until final closure is approved. Other state permits may include those for Stormwater management, wastewater management/discharge, air, traffic/NCDOT entrance, and erosion and sediment control. Local permits and other submittals that may be required include:

- Zoning Compliance Permit and/or Amendment Application
- Special Use Permit
- Erosion Control Plan
- Land Disturbance Permit
- Site Plan

8.0 SCHEDULES

Building Permit (and fire marshall approval)

- Sign Permits
- Permit modification of areas potentially affected by facility relocation, such as the HHW management area

In **Exhibits 8 and 9** below, SCS presents preliminary schedules for capital budget planning and estimated costs, respectively. They is broken down into two major activities:

- 1. Design, Permitting, and Bidding (Contractor Procurement): This activity includes Architectural/Engineering design (including site surveying and subsurface investigation, if warranted), permitting, and bid issuance/contractor procurement.
- 2. CA/Construction: This activity includes Construction Administration and Construction.

Exhibit 8 presents duration estimates and the assumed impacted fiscal year (FY) budgets. SCS acknowledges that this schedule is for budgetary and planning purposes only and is subject to unpredictable and/or highly variable unknowns during the course of the project.

	Duration	0	F		FY	
lask	(yr)	Start	End	2023	2024	2025
Design, Permitting & Bidding	1.5	July 1, 2022	December 2023	Х	Х	
CA/Construction Contract	1	March 2024	December 2024		Х	Х

Exhibit 8. Estimated Schedule

Exhibit 9 contains approximate budgetary-level costs for the County for each assumed impacted FY. SCS acknowledges that cost estimates are approximate for budgetary purposes only and are subject to unpredictable and/or highly variable unknowns during the course of the anticipated tasks.

Exhibit 9.	Estimated Budgetary Schedule
------------	------------------------------

Taak	Cost Est.	FY Costs (in FY 22 \$s)			
Task	(Total)	2023	2024	2025	
Design, Permitting & Bidding ¹	\$500,000	\$425,000	\$75,000	NA	
CA/Construction Contract ²	\$3,953,800	NA	\$1,581,520	\$2,372,280	

Note:

1. Split estimated as 85% expended in FY 2023 and 15% in FY 2024.

2. Split estimated as 40% expended in FY 2024 and 60% in FY 2025.

9.0 SUMMARY AND KEY CONCLUSIONS

Key findings of the preliminary conceptual design process and several key conclusions of the Study are as follows:

- SCS reviewed three site location options on or adjacent to the Stony Mountain Road solid waste facility, and considered the potential for a fourth option, a theoretical off-site location not identified. The first three options were considered with anticipated setback (buffer) distance from existing features such as public roadways as stipulated by state solid waste rules and County planning department requirements.
- The County selected Area 2 for further investigation. SCS developed preliminary layout configurations for a third transfer station building, which were superimposed on two different locations within Area 2. The third shed was assumed to accept waste from residential and small-load commercial haulers only.
- The County selected the North layout location, which is approximately situated behind Shed No. 2 as if the existing building were mirrored over the current transfer trailer bypass lane. This location is believed to allow for potential development of a fourth transfer station shed to the south in the future in a location that similarly mirrors existing Shed No. 1.
- SCS developed a preliminary conceptual design of a transfer station building at the selected northern location. Estimated required floor areas, rough grading, and select other traffic and structural site features were included in the concept design. A key difference between the concept and the existing sheds was the inclusion of a side entrance, although the future shed operations and general design configuration was assumed to be similar to the existing sheds.
- SCS developed a preliminary/budgetary-level cost estimate for the third shed development. Unit costs for individual line items were generally based on CY 2021 RS Means construction cost values where available, with an inflationary factor applied.

APPENDIX A KICKOFF MEETING MINUTES

SCS ENGINEERS

October 4, 2021 File No. 02220205.01

MEMORANDUM

- TO: Marcus Jones and Joe Roberts, Henderson County, NC
- FROM: Ryan Duckett and Kenton Yang, SCS Engineers
- SUBJECT: Henderson County Transfer Station Shed No. 3 Preliminary Engineering Report Kickoff and Workshop Meeting Minutes - *FINAL*

Minutes are included below. Action items are bold and highlighted in yellow.

SUMMARY OF MINUTES

1. Purpose

• The purpose of the meeting was to kick off the Shed No. 3 Preliminary Engineering Report (PER) effort, develop an understanding of current conditions, understand project drivers and workshop potential development areas and operational options.

2. Review of Existing Services

- About 70% of tipped material is estimated to come from "Haulers," aka large commercial collection operations.
- There is no differentiation between received traditional MSW versus construction and demolition (C&D) debris during tipping transactions.
- a) Shed No. 1
 - Shed 1 currently handles customers with automated dumping equipment, including larger commercial waste collection customers ("Haulers"), contractors (aka roll-offs, dump trucks and self-dumping trailers), and even pickup trucks with hydraulics.
- b) Shed No. 2
 - Shed 2 currently has about 1/3 of its space dedicated to commercial/residential recycling receiving (i.e., the same commercial customers use Shed No. 1). It is also used for residential solid waste customers and small "Mom and Pop" commercial collection customers.
- c) Payment systems

0

MEMORANDUM October 4, 2021 Page 2

- Approximately 80% of Hauler customers use the WasteWIZARD scales and therefore bypass the main scales.
- The WasteWIZARD scales are preferred by large commercial customers due to the efficiency at which it weighs customers and moves them through the line (tare weights are pre-loaded and input of material type and account are handled by the user.
- The WasteWIZARD also provides a useful enforcement mechanism for the County if a contractor/hauler does not abide by facility rules, it can lose WasteWIZARD privileges.
- If haulers have both recycling and solid waste in the same load, they need to go through the scales (WasteWIZARD) up to three times, causing extra traffic congestion.
- Residents and contractor are weighed at the scales.
- To relieve traffic congestion, the County allows residents and other customers without accounts to present their previous scales receipts to prove their vehicle's tare weight, bypassing the need for back-end weighing/payment transaction.
- d) Other areas
 - "Mom and Pop" commercial collection customers use Area 3, which includes a solid waste compactor, open top waste containers, and an area to manually unload blue bag recycling. Area 3 has recycling and MSW disposal.
 - Area 4 is used exclusively for special item recycling requiring payment aka tires and large televisions.
 - The convenience center is a free residential-customers-only area and there is not an annual fee.
- Currently traffic bottlenecks are either at the scalehouse as customers queue in line prior to being initially weighed or at the stop sign immediately following the main scalehouse as customers prepare to traverse the main intersection area at the existing Sheds 1 and 2.
- Additional prolonged queuing sometimes occurs on the back end of the process, at reweighing on the westbound side of the scales.
- Area 3 was developed and constructed in 2010 to address issues with service capacity of the sheds. Additionally, the scales/scalehouse were installed at that time.
- All compactors are single-stream recycling. County is considering purchasing compactors for waste.
- See attached Figure 1.
- **LATE ENTRY** Marcus Jones provided **Figure 3** presenting current traffic flow and potential future hauler traffic flow.

3. Review of Proposed Shed No. 3 Services/Drivers

- The following are primary drivers of the Shed No. 3 project.
 - **Capacity**: The Shed No. 1 tipping floor is damaged. The capacity loss for floor repair may not be achievable without a third shed in service. Additionally, a 3rd shed would provide for current service and future growth.
 - **Efficiency**: Haulers provide the majority of the revenue from tipping fees, and therefore it seems appropriate to prioritize them in terms of ease of using the facility.
 - **Efficiency:** The County desires to pull capacity from the current Area 3/4 areas, which, because of their remote locations and formats of collection, do not lend themselves to efficient collections due to double handling.

- Separation/Safety: Have an area dedicated to Hauler customers such that residential customers may be safely segregated from the large vehicles typically used by the haulers. Furthermore, a recycling receiving bay with a waste receiving bay for haulers is required.
- Traffic queuing and vehicle stacking is not a major issue. The main consideration is getting haulers in and out of the site.

4. Other Potential Development Sites

- It is highly unlikely that a geographically separate site away from the Stony Mountain Road facility will be developed for a second transfer station location in the County.
- a) Updated landfill facility boundary?
 - Kenton to confirm with Allen Gaither on the current landfill facility boundary.
- b) New shed within the facility boundary new NCDEQ regulations do not apply
- c) West/north/east discussions
 - Alternate location options were discussed (see Figure 2):
 - Area 1 area to the east of the convenience center. This area was deemed a possibly location.
 - Pros: use convenience center road, ample stacking space, and within the landfill facility boundary
 - Cons: separated from other operations, area with steep slopes, convenience center access road has experienced some settlement due to possible old waste material located in the vicinity. Adjacent neighbors may be disturbed.
 - Area 2 south of current transfer sheds in vicinity of maintenance
 - shop/administrative building.
 - Pros: keep the current transfer operations in a compact vicinity and possibly allow strategic reuse of existing scales facilities, developed internal roads, and egress. Favorable topography, potential expandability and within the landfill facility boundary
 - Cons: demolition or reconfiguration of the current maintenance shop, admin building, and possibly other existing structures.
- d) New off-site location
 - It is highly unlikely that a geographically separate site away from the Stony Mountain Road facility will be developed for a second transfer station location in the County.
 - Siting a new transfer station will be difficult due to property requirements, costs and public perception (ie firing range).
 - Significant increase in operational cost (ie, new equipment and additional staff) which will likely require a revised funding policy for Solid Waste (pay at Convenience Center and/or availability fee on tax bill, or flow control).
 - Difficult not add new convenience center with new transfer station which will increase costs.
 - Current site is in geographical center of County and thusly provides efficient services for County residents and customers.

5. Bus Garage Parcel Discussion

• The bus station parcel (Area 3) may be better suited for future activities such as HHW collection events or special material drop off which do not require significant earthwork.

- Kenton to ask Allen Gaither about permitting and other requirements for using the bus garage parcel as tires and/or TVs receiving area, empty trailer storage, and/or yard debris storage.
- a) New shed outside the landfill facility boundary new NCDEQ regulations apply which include
 1. Siting requirements floodplain, waters of the US, etc.
 - No WOTUS stream shown in National Wetlands Inventory online tool, but a formal survey is recommended
 - Cultural considerations such as spacing from cemetery and retention of the cemetery parking.
 - 2. Buffers supply wells?
 - Downgradient water supply wells are not expected to be an issue given recent groundwater remediation efforts concerning properties south of Stony Mountain Road related to the closed MSW landfill. Also the parcel is on City water.
 - 3. Traffic study
 - NCDEQ requires a traffic study per the new transfer station regulations. A traffic study would not be required for any site within the current landfill facility boundary.
- b) County Land Development Code
 - 1. School Board would sign off or transfer parcel
 - Property acquisition is not expected to be an issue.
 - 2. Zoning local commercial/residential
 - Height restriction of 40' in local commercial zone may be an issue, as current bays exceed that threshold. Marcus to start discussing with Planning.
 - 3. Will not require SUP, major site plan
 - 4. ROW buffer is 15' and 20'
 - 5. Setback = 150'
 - 6. No TIA is anticipated
 - 7. Will require B2 planting buffer
 - 8. Plantings can be within the setback
 - 9. Parking requirements will more than likely not be required
 - 10. Open space requirements are not required
 - 11. Cemetery can develop up to the property line without buffer on the south side.
- Based on the County setback (150') and the state property buffer (100'), the usable area is approximately 1.6 acres. The current Shed Nos. 1 and 2 area is approximately 2 acres. Kenton to ask Allen about the property buffer on the entrance road ROW.
- LATE ENTRY if the bus parcel is used, County would like connectivity (internal access) to current parcel.

6. Site Inspection

- a) Bus garage walk
 - SCS noted the retaining wall abutting the south end of the cemetery area appeared to be in disrepair, and may not necessarily correspond to the limits of the cemetery.
 - The building on the west side of the parcel appears to be in good shape and may be able to be reused.
- b) Shed No. 2 investigation

• Wash water appears to be flowing under the metal wall edge in contact with the floor slab and contributing the floor crack that is seen from the tunnel.

AREA 2 DISCUSSIONS

The team discussed possible Area 2 circulation. **Figure 4** depicts a clockwise circulation with an exit only on to Stoney Mountain Road. This option did not seem to work as traffic would be crossing traffic at the stop sign.



Figure 4 – Area 2 Clockwise Option

Figure 5 presents a counterclockwise option. If haulers use the new shed - the WasteWIZARD could be used close to it current location and possibly a right only lane can be developed at the stop sign. An exit only could be incorporated.

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Figure 5 – Area 2 Counterclockwise Option

LATE ENTRY – County has proposed hauler exit only options on to Stoney Mountain Rd presented on Figure 3.

ADDITIONAL FEEDBACK FROM COUNTY (SEPTEMBER 23, 2021)

After the meeting the County further brainstormed the Shed No. 3 project and provided the following feedback to SCS:

- One possible configuration for the new shed would be to have customers access from the side perpendicular to the direction the loader pushes: under this proposed format the shed would be 2 sided or 3 with opening for load at back.
- Regarding the traffic flow of the SWAC site: clockwise traffic flow will have a crossing of residents and haulers after the scales. Thus, a counterclockwise directionality may be preferred. Haulers (green) may use Shed Nos. 1 and 2. Residents (black) may use the new Shed No. 3.
- It is likely the County will need to extend the WasteWIZARD lane to Stoney Mountain Rd.

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- LINE OF SEPARATA - HAULERS - OTHERS - RESIDENTS EXPANSION NOOD / COMBORT

APPENDIX B REFERENCE MAPS

APPENDIX B-1 Map of Existing Facilities and Services

Shed No. 2 - about 1/3 of its space dedicated to commercial/ residential recycling receiving. Same commercial customers that use Shed No. 1.

It is also used for residential solid waste customers and small "Mom and Pop" commercial collection customers.

Scales - residential/contractors WasteWIZARD bypass - Haulers

FIGURE 1 - EXISTING SERVICES

Approximately 80% of Hauler customers use the WasteWIZARD scales and therefore bypass the main scales

- commercial waste collection customers ("Haulers") trailers) - pickup trucks with hydraulics



APPENDIX B-2 Map of Potential Areas for Shed #3 Location



APPENDIX C SHED #3 SITING OPTIONS ANALYSIS

Henderson County

Transfer Station - Shed No. 3 Options Analysis

Considerations	Areas				Commonto	
Considerations	1	2	3	4 (Off-site)	comments	
County Centroid		3	3	0	Areas 1-3 are at the current site which is located in the centroid of the County. Area 4 ranks 0 because a candidate site is unknown at this time.	
Current County Property	З	3	3	0	Areas 1-3 are at the current site on County property. Area 4 ranks 0 because a candidate site is unknown at this time.	
Central Operations		3	3	0	Areas 2-3 are close to the existing sheds and existing equipment/staff can potential travel between areas. Using equipment/staff for Area 1, is possible but not likely.	
Favorable Topography	1	3	2	0	Area 1 has steep terrian. Area 2 has favorable topography. Area 3 is flat which will require earthwork.	
Limits Sensitive Receptors Impact	0	3	З	0	Area 1 is close to neighboring houses.	
Expandability	2	3	0	0	Area 1 appears to have some expansion potential. Area 2 appears to be able to expand similar to the existing sheds.	
Development Costs	2	2	2	0	Areas 1-3 each have specific development costs concerns. Area 4 ranks 0 because a candidate site is unknown at this time. Potential for the County to purchase property.	
Operational Costs	1	2	2	1	Areas 1 and 4 will most likely require additional equipment and staff. Existing staff and equipment may be used at the existing sheds and sheds in Areas 2-3.	
TOTAL	13	22	18	1		

3 is ideal

2 is less than ideal

1 is not ideal but worth consideration

0 unknown or not desirable

APPENDIX D PRELIMINARY SIZING MEMO AND CALCULATIONS

SCS ENGINEERS

February 16, 2022 File No. 02220205.01-3

MEMORANDUM

TO: Marcus A. Jones, PE

FROM: Kenton Yang, PE, Ryan Duckett, PE, Alexander Hajek

SUBJECT: Henderson County Transfer Station Shed #3 PER

Dear Mr. Jones:

Enclosed is a summary of calculations for preliminary sizing of the third-shed expansion for the Henderson County transfer station for anticipated resident and "mom and pop" hauler use. Per our meeting on November 4th, 2021, the assumptions used in these calculations are as follows:

- Design tipping floor storage is 0.25 of a day.
- The facility will operate 9 hours per day, 6 days per week, consistent with current operations.
- The average residential load is 0.33 tons. The average residential unload time is 6.3 minutes.
- Floor sizing calculations consider 3 customer unloading positions, with a fourth available within the planned contingency storage area if necessary. Each vehicle position is assumed to be 15 feet long and 9 feet wide, for a total dedicated unloading area of 675 square feet (25 feet long by 27 feet wide).
- The contingency storage area was sized to assume push- wall will have a 1:1 slope.
- The design storage area is 72 feet in length and 23 feet in width (1660 square feet total).
- The shed was designed using specifications for the county's recently purchased Cat 938M loader. The loader turn radius is 22 feet. Ten feet were added to the turn radius as a factor of safety due to proximity to users and the open pit when in use. The length of the loader with the bucket on the ground is 30 feet; a 30-foot design loadout space was assessed as appropriate for this project.
- Vehicle queue distance was assessed as 2075 feet, considering average vehicle length was estimated to be 15 feet with 3 feet of spacing between vehicles. This calculation assumes 5 unloading positions.
- From County economic reports, 2.30% was used as the year-over-year population growth rate for projecting future transfer station use. This value was assumed to correspond to the approximate waste disposal growth rate. This value was used to estimate monthly waste quantities received from 2022 through 2044.
- Calculations considered a 20-year transfer station service life.

• The quantity of residential waste to be received at the third shed was estimated by subtracting commercial waste (hauler) tonnage from total waste tonnage. Waste quantity data was obtained from the scale ticket summary from daily materials and solid waste reporting documents. Residential waste was assessed to be 38% of total waste.

As the conceptual design process proceeds, calculations may change and will be finalized for the Preliminary Engineering Report. If you have any questions, please contact Ryan Duckett, PE, at <u>RDuckett@scsengineers.com</u> or 804-525-8746.

CLIENT: PROJECT: PROJECT NUMBER: SUBJECT: Henderson County Henderson County Transfer Station 2220205.01-3 Transfer Station Preliminary Design Page: 1 of 4 PREPARED BY: AVH REVIEWED BY: RJD APPROVED BY:

TRANSFER STATION DESIGN

DESIGN CRITERIA

Design Capacity:	342 tons/day	Assumes	6 days/wk
Tipping Floor Storage:	0.25 days		
Facility Operation Time per Day:	9 hours/day		
Facility Operation Days per Week:	<mark>6</mark> days/wk		
Facility Operation Time per Week:	54 hours/wk		
Average Throughput:	38 tons/hr		
Throughput on Peak Day-of-Week (Avg):	76 tons/hr	Assumes 4x Overall	Average
Traffic and Unloading Assumptions			
Average Load Quantity:			
Residential Load:	0.33 tons		
Average Unload Time:			
Residential Unload Time:	6.3 minutes		
	0.11 hours		
DESIGN SUMMARY:			
Recommended Number of Unload Positions:	5 Positions		
Total Unload Area	1500 sq. Feet		
Unload Length	25 Feet		
Unload Width	60 Feet		
Tipping Floor Storage Area:	1660 sq. Feet		
Tipping Floor Length	72 Feet		
Tipping Floor Width	23 Feet		
Design Turn Radius:	32 Feet		
Load Out Space:	30 Feet		
Queuing Distance:	2075 Feet		

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Page: 2 of 4 PREPARED BY: AVH REVIEWED BY: RJD APPROVED BY:

NUMBER OF UNLOAD POSITIONS



		5,
CLIENT:	Henderson County	PREPARED BY: AVH
PROJECT:	Henderson County Transfer Station	REVIEWED BY: RJD
PROJECT NUMBER:	2220205.01-3	APPROVED BY:
SUBJECT:	Transfer Station Preliminary Design	

TIPPING FLOOR DESIGN

Page: 3 of 4



CLIENT: PROJECT: PROJECT NUMBER: SUBJECT:

Henderson County Henderson County Transfer Station 2220205.01-3 Transfer Station Preliminary Design Page: 4 of 4 PREPARED BY: AVH REVIEWED BY: RJD APPROVED BY:

OPERATIONS DESIGN

Truck Loading Space:		
Design Loader: Cat 938M Loader		-
Loader Turn Radius	22 feet	
Safety Factor	10 feet	
Design Turn Radius	32 feet	
Load Out Space:		
Length of Loader with Raised Bucket Ove	r Wall:	4
Bucket on Ground	35 Feet	
Bucket Reach	5 Feet	
Design Load Out Space:	30 Feet	
Queuing Distance Needed:		
Queue distance uses peak half hour of traj	ffic	
Throughput on Peak Day-of-Week (Avg):	76 tons	
Peak Half-Hour	38 tons at	0.33 tons per vehicle
Peak Half-Hour Traffic	115 vehicles	
Vehicle Length	15 feet	
Vehicle Spacing	<u>3</u> feet	
Total Queuing Distance	2075 feet	
Total Queue distance includes scalehouse	queue.	

APPENDIX E PRELIMINARY LAYOUTS

APPENDIX E-1 Preliminary Layout 1: North Location



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ING SPACES HEAVY LINE TEAD BEYOND JRAL SHELL		HENDERSON COUNTY, NC ENGINEERING DEPARTMENT HENDERSONVILLE, NC 28792 1 HISTORIC COURTHOUSE SQUARE
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APPENDIX E-2 Preliminary Layout 2: South Location



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	SHEET TILE SHED #3 LAYOUT 2	PROJECT TITLE	HENDERSON COUNTY BAY 3 PER
	CLIENT HENDERSON COUNTY, NC ENGINEERING DEPARTMENT HENDERSONVILLE, NC 28792 1 HISTORIC COURTHOUSE SQUARE		HENDERSONVILLE, NC 28/92 1 HISTORIC COURTHOUSE SQUARE
G	SCS ENGINEERS	CONSULTING ENGINEERS, INC. 1527 IND.CTHAN PKE. #305. IND. 1527 IND.CTHAN PKE. #305. IND.CTHAN, VA 23113 PH. (804)378-7440 FAX. (804) 378-7433	Рекол. ио. 02220205.01-03 рми. Вт. 038. Вт. Бак. Вт. К.JD
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APPENDIX F PREFERRED CONCEPT DESIGN APPENDIX F-1 Figure 1: Transfer Station Layout



FIGURE 1 - TRANSFER STATION CONCEPTUAL LAYOUT

APPENDIX F-2

Figure 2: Transfer Station Preliminary Grading





FIGURE 2 - TRANSFER STATION PRELIMINARY GRADING

APPENDIX G PRELIMINARY OPINION OF BUDGETARY COST

ENGINEER'S OPINION OF PRELIMINARY/BUDGETARY COST HENDERSON COUNTY, NC, TRANSFER STATION BAY #3 CONSTRUCTION STONY MOUNTAIN ROAD SOLID WASTE TRANSFER FACILITY HENDERSONVILLE, NC

SCS ENGINEERS

Date: Project Number:	1/21/2022 02220205.01-03				IF: Inflation Fctr (CY '21 to	22) = 1.07
CATEGORY	ITEM	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT PRICE EST. (w/IF)	TOTAL EST.
Cito Dronoration	Cut	SITE PREPARATION; EARTHWORKS	6000	In c v	¢ 0.90	ć 58.800
Site Preparation	Rippable rock	Excavating, Buik, Juzer, 105 Hr, 500 Hau, Common Earth Contingency for Excavation	900	CY	\$ 9.80	\$ 58,800
Site Preparation	Non-rippable rock	Contingency for Excavation	120	CY	\$ 107.00	\$ 12,800
Site Preparation	Unsuitable soils	Contingency for Excavation	1200	CY	\$ 10.70	\$ 12,800
Site Preparation	Fill	Backfill, Structural, Dozer or F.E. loader, from existing stockpile, no compaction, 1005 HP, 300° haul, common earth Building demolition example huildings or existing stockpile, no compaction, 1005 HP, 300° haul, common earth Building demolition existing buildings, expected, includes 20 mile baul, excludes calueds for addition of demolition or dump foor	450	L.C.Y.	\$ 4.28 \$ 100,000,00	\$ 1,900 \$ 100,000
Site Preparation	Electric Power Pole Reloc.	building demonstron, sman buildings of single buildings, concrete, includes zo mile nau, excludes salvage, foundation demonstron of dump rees.	1	LS	\$ 75,000.00	\$ 75,000
					CATEGORY SUBTOTAL	\$ 285,400
Substructure	Heavyweight Concrete	Heavweight concrete, ready mix, delivered, includes local ageregate, sand. Portland cement (Typ I) & water, excl additives/treatments, 5000 psi; 15" d	5344	SF	\$ 42.80	\$ 228,700
Substructure	Retaining Walls		352	CY	\$ 327.81	\$ 115,500
						¢ 244.200
		SHELL CONSTRUCTION			CATEGORY SUBTOTAL	\$ 344,200
Shell	Pre-Engineered Steel Bldg	Pre-engineered steel building, clear span rigid frame, 30 psf roof/20 psf wind load, 50' to 100' W x 24' eave H, incl. 26 ga.	7000	SF Flr.	\$ 26.75	\$ 187,300
Shell	Eave Overhang	Pre-engineered steel building accessory items, eave overhang, with soffit, 26 gauge, 2' W	200	LF	\$ 60.20	\$ 12,000
Shell	Skylight	Pre-engineered steel building accessory items, skylight, fiberglass panels, to 30 SF	6	Ea.	\$ 288.91	\$ 1,700
Door	Roor vents Roll-up Side Door	Pre-engineered steel building accessory roi-up door for residential side entrance pre-engineered steel building accessory items: roof yents, turbine ventilation, wind driven, galvanized. 24" diameter, incl. pitched base, excl. damper	1	Ea.	\$ 637.90	\$ 3,800
					÷,	+
					CATEGORY SUBTOTAL	\$ 204,800
Push Wall	Puch Walls Along Side	INTERIOR CONSTRUCTION: PRIMARY IS FEATURES	180	IL E	\$ 289.54	\$ 52.100
Push Wall	Armament	East in processioning wars, removed energies connected and the state of the state o	2002	SF	\$ 126.26	\$ 252,800
Pit/Chute	Pit Construction		1	LS	\$ 10,000.00	\$ 10,000
Pit/Chute	Concrete Knee Wall	Same Unit Pricing as Retaining Wall; assumes 1'x6'x45' Knee Wall Around Pit	13.2	CY	\$ 327.81	\$ 4,300
Tunnel	Tunnel	Additional materials (frame, curbing, shell, reinforcement etc) Trailer weight cases and concrete out for tunnel	1.0	LS	\$ 30,000.00	\$ 30,000
Liquids Management	Trench Drain	Trench Drain Similar to Existing	1.0	LS	\$ 7,490.00	\$ 7,500
Liquids Management	Conveyances	Assumes connected to existing line near tunnel path	1.0	LS	\$ 20,000.00	\$ 20,000
Liquids Management	Connection to Exist. Infras.	Oil/Water Seperator, Upgraded/New Grit Chamber, Other Upgrades	1.0	LS	\$ 100,000.00	\$ 100,000
		L			CATEGORY SUBTOTAL	\$ 576,700
		INTERIOR/EXTERIOR SERVICES				,,
Building Services-Safety	Smoke Detector	Photoelectric smoke detector with strobe 120 V, 90 DB ceiling mount	e	Ea.	\$ 328.43	\$ 2,000
Building Services-Safety	Sprinkler System Alarm	Sprinkler system components, Alarm, electric pressure switch (circuit closer).	1	Ea.	\$ 151.28 \$ 101.55	\$ 200
Building Services-Safety	Misc MEP/security	Prexioe sprinkter nead connectors, or arded stammess steer nose with mounting bracket, 1/2 and 3/4 outlet size, 60 rength.	10	LS.	\$ 50.000.00	\$ 1,000
Building Services-Lighting	Light Poles	Light poles, anchor base, aluminum, 16' high, excl concrete bases	8	Ea.	\$ 869.84	\$ 7,000
Building Services-Lighting	Outdoor Lights	Parking LED Luminaire, round pole mounting, 88 lamp watts, excl pole	8	Ea.	\$ 1,678.28	\$ 13,400
Building Services-Lighting	Concrete Light Pole Base	Structural concrete, in place, spread footing (3000 psi), <1 C.Y., inc. forms (4 uses), Grade 60 rebar, concrete (Portland cement Type I), place/finish	8	CY	\$ 437.06	\$ 3,500
Building Services-Electricity	Electric Switchboard	Interior HID Fixtures Incl. Jamps and mounting naroware, Pendant, round, 150 watt.	15	Ea.	\$ 1,204.22 \$ 8 150.40	\$ 18,100
Building Services-Electricity	Electric Meter	Smart metering, in panel, three phase, 120/280 volt, 400 amp	1	Ea.	\$ 2,696.96	\$ 2,700
Building Services-Electricity	PVC Conduit	PVC conduit, schedule 40, 2-1/2" diameter, to 10' H, incl terminations, fittings. & support	300	LF	\$ 11.02	\$ 3,300
Building Services-Ventilation	Fans/Ventilation		1	LS	\$ 30,000.00	\$ 30,000
building services-rire	Advanced Sprinkler System		-		\$ 50,000.00	\$ 50,000
					CATEGORY SUBTOTAL	\$ 189,400
Erosion Control	Povogotation mat	EROSION & SEDIMENT CONTROL	1000	le v	¢ 2.09	Ś 4.000
Erosion Control	Silt Fence, install and remove	Synthetic erosion control, itt fence, install and remove, 3' high	250	L.F.	\$ 2.51	\$ 600
Erosion Control	Misc ESC		1	LS	\$ 10,000.00	\$ 10,000
Site Preparation	Clearing Light Trees	Cleaning & grubbing, cut & chip light trees, to 6" diameter	0.5	Acres	\$ 3,939.74	\$ 2,000
Site Preparation	Topsoil Stripping	Topsoil stripping and stockpiling, topsoil, sandy loam, adverse conditions, 200 HP dozer	1000	C.Y.	\$ 1.88 \$ 13 169 99	\$ 1,900 \$ 1,300
Erosion Control	Rip-Rap Lining	Rip-rap and rock lining, random, broken stone, 18" minimum thickness, machine placed for slope protection, not grouted	250	S.Y.	\$ 77.48	\$ 19,400
Erosion Control	Soil Stabilization	Soil stabilization, hydrated lime, for base, 6% mix by weight, 12" deep, includes scarifying and compaction.	1000	S.Y.	\$ 12.07	\$ 12,100
Site Preparation	Utility Trench Excavation	Excavating, chain trencher, utility trench, rock material, 115 HP, 6" wide, 30" deep, teeth change every 100' of trench	300	L.F.	\$ 35.15	\$ 10,500
Site Restoration	Landscaping	Seeong, mechanicar seeong, 213 ib.74cre	2	Acres	\$ 1,040.88	\$ 2,100
					CATEGORY SUBTOTAL	\$ 74,600
Roadway	Aggregate Roadway base	Base course drainage layers, aggregate base course for roadways and large paved areas, stone base. compacted. 3/4" stone base. to 6" deen	1532	S.Y.	\$ 7.17	\$ 11.000
Roadway	Asphalt Paving Base Course	Asphalt paving, plant mixed asphaltic base courses for roadways and large paved areas, bituminous concrete, 6" thick.	1532	S.Y.	\$ 27.98	\$ 42,900
Roadway	Asphalt Paving Binder Course	Asphalt paving, plant mixed asphaltic base courses for roadways and large paved areas, bituminous concrete, 4" thick	1532	S.Y.	\$ 19.23	\$ 29,500
Roadway	Asphalt Paving Top Course	Asphait paving, plant mixed asphaltic base courses for roadways and large paved areas, bitminous concrete, 2" thick Motal paving, plant mixed asphaltic base courses for roadways and large paved areas, bitminous concrete, 2" thick	1532	S.Y.	\$ 9.61 \$ 962.42	\$ 14,700
Roadway	Pavement Markings	Painted parking oumpers, pipe domards, enterce meet/painted, or Ex+ of hole, or of hole, o	5000	L.F.	\$ 0.31	\$ 1,600
Entrance Apron	Pavement Surface	Non-structural concrete veneer	715	SY	\$ 160.50	\$ 114,800
						ć 334.000
		STORMWATER MANAGEMENT FEATURES			CATEGORY SUBTOTAL	\$ 224,000
Stormwater	Stormwater Features	Assumed as 25% of project costs	25%	EA	\$ 1,899,100	\$ 474,800
						Á 474.000
						\$ 2.373.900
						, , ,
		MISCELLANEOUS SERVICES, CONTINGENCY, AND OTHER ITEMS	5		DEDOEMET OF DAGES	274/6
		LATEGURY Mobilization/Demobilization		109	PERCENTAGE BASED LINE ITEM TO	S 254 700
		Construction Stakeout/Record Survey		10%	\$ 238,000 \$ 24.000	\$ 254,700
		Permits/Bonds/Insurance		3%	6 \$ 72,000	\$ 77,000
		Soil/Materials Testing		5%	\$ 119,000	\$ 127,300
		Minor Items (signs, bumpers, locks, supplies, etc) Contingency		3%	5 72,000	\$ 77,000
		Engineering/Architecture Services (During Construction)		10%	\$ 238.000	\$ 254,700
			•		CATEGORY SUBTOTAL	\$ 1,324,700
				C	ONSTRUCTION + MISC. SERVICES TOTAL	\$ 3,698,600
		EQUIPMENT				
Building Services-Loader	Loader	Loader wheel type 112 HP, 1-1/2 CY capacity	1	EA	\$ 255,195	\$ 255,200

Note: Permitting, design and bidding services are not included in this budget.

CATEGORY SUBTOTAL \$
EST. PROJECT TOTAL \$

3,953,800