SAN LUIS VALLEY
WASTE DIVERSION STUDY
Draft Report – October 2017

Prepared for: San Luis Valley Ecosystem Council & Conejos Clean Water

Submitted by: LBA Associates, Inc.
Solutions for Sustainable Waste Diversion

LBA ASSOCIATES

The San Luis Valley Waste Diversion Study was completed with grant funding from the State of Colorado Recycling Resources Economic Opportunity and USEPA Environmental Justice Collaborative Problem-Solving grant programs. Its success was made possible by numerous stakeholders throughout the valley, but special thanks are given to:

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EXECUTIVE SUMMARY

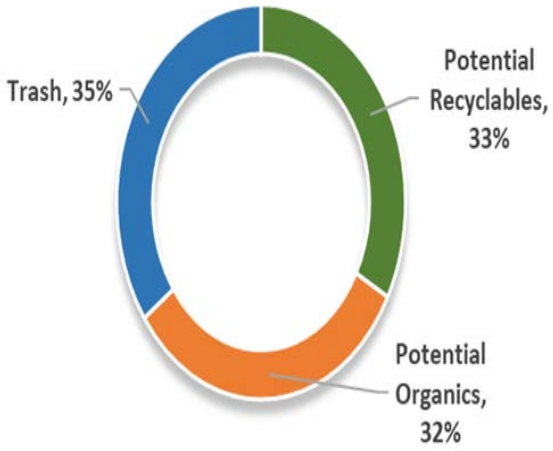
The San Luis Valley Ecosystem Council (SLVEC) and Conejos Clean Water (CCW) partnered to complete this Waste Diversion Study for the San Luis Valley. They obtained funding to conduct the study and researched existing conditions, which established a regional diversion rate of 18%. Committed to improvement, they engaged a large Task Force and LBA Associates, conducted a substantial planning process and ultimately identified three program and infrastructure options that are environmentally and economically sustainable and support local hauling businesses.

Baseline Findings

Early research confirmed that:

- The valley's low population density, large size and distance to markets makes waste diversion economics challenging – and limits recycling access to many communities
- More than 30% of trash generated by residents and businesses could be recycled if more waste generators had access
- Many waste generators, public agency staff and elected officials lack the knowledge and information to support and engage in sound waste diversion practices
- The valley's schools and students are an untapped resource for building a strong waste diversion foundation

Figure ES-1
Potential for Diversion



Key Waste Diversion Improvements

To address these issues, three waste diversion improvements were evaluated over a 10-year planning period that extends through 2027:

1) ***Regional Recycling and Trash Drop Site System*** – This assessment was based on a permanently-located model drop site facility with a constructed base, fencing and surveillance that will collect both source-separated recyclables and trash. Designed to be replicated throughout the valley, this system could divert from 90 tons or recyclables (1 average site) to 900 tons annually (10 sites). The system will require modest staffing and maintenance, but would be flexible enough to accommodate changes in quantities, haulers and other programs over time.

Many variables will impact the capital cost of each site, and will vary depending on its location. These variables must be considered when establishing funding and partnerships for each site. One promising revenue stream for drop site operations (pre-paid trash bags) was explored in this study and found to be on par with what local households any pay for trash-only service today.

2) ***Rickey Recycling Center Enhancements*** – The new recyclables collected from the drop site and school programs will be aggregated for baling at the City of Alamosa's Rickey Recycling Center prior to shipment to end markets. Enhancements at this facility will be needed to accommodate these tons over the next 10 years, including a new baling system and additional staff. The City of Alamosa is expected to be a project partner in the purchase or a new baler/conveyor, and new labor costs would be compensated through a tip fee paid by the regional and school drop sites as their share of facility operating costs.

3) ***Education Programs*** – These were targeted to the school system and public staff/elected officials. The school program focuses on the current recycling program at the Conejos High School in La Jara, and includes a new recycling drop depot (like the regional system but without trash collection), leveraging and growing the existing student-driven recycling club and adding new course curricula. The public staff and elected official program provides a comprehensive but efficient tutorial that can easily be added to work session agendas, will make its audience comfortable with waste diversion facts and figures, and will add credibility to public support of programs and facilities.

Implementation

It is expected that much of the program capitalization described in the following pages will be obtained through new funding. Conservatively considering all recommendations described in Table ES-1 (next page), the total cost of implementation could exceed $1 million over the next 10 years. To break this investment into logical and achievable steps, it is recommended that implementation be broken into the three phases shown in Figure ES-2.

Table ES-12
Recommended Implementation Schedule

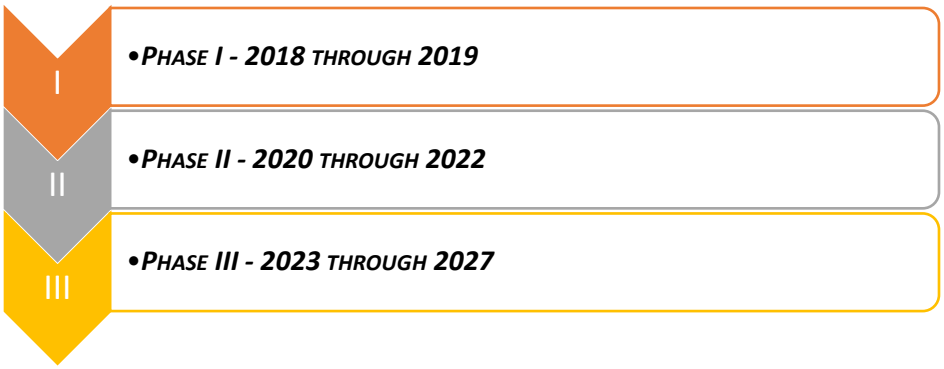


Table ES-1
Recommended Program Components and Phased Implementation

Program	*Key Benefits*	*Implementation Timing*	*Estimated Costs (2017$)*
Regional Recycling Drop Sites	• Provides much-needed access to rural communities • Flexible & low-tech operations • May divert up to 900 tons/year	• Phase II – develop 3 initial sites *(it is recommended that drop sites be delayed until the City of Alamosa finalizes any changes to the RRC, if any)* • Phase III – develop additional sites	• Capital $66,000 to $110,000/site with ability to reduce if commingled is acceptable in the future (grant funding) • Operating costs $80,000-$95,000 also likely to decrease with commingling (user fees)
RRC Enhance-ments	• Critical to drop site system (cannot expect Alamosa to cover costs) • Feasibility proven by existing baler	• Phase II – install new baler *(RRC enhancements will not be needed until drop sites are brought on-line)*	• Capital $355,000 (grant funding) • Operating /labor costs (covered by drop site user fees embedded in operating costs)
Education	• May divert up to 740 tpy (district) • Support community culture shift • Obtain active support for programs	• Phase I - develop content for Conejos High School & public staff/elected official work education programs • Phase II – develop recycling depot at Conejos High School	• Capital $26,000 for CHS recycling depot (existing grant resources) • Capital $20,000 for public staff/elected official program (grant funding) • Operating $7,000/year for North Conejos County School District program (without teacher, custodial or other school labor costs)

Potential for Success

This comprehensive waste diversion strategy has the potential to establish a firm foundation for waste diversion practices throughout the region and catalyze program effectiveness for the long-term by specifically:

- Increasing the quantity of traditional recyclables diverted by more than two times and raising the region's diversion rate to 22% (nearly twice the state average)
- Reducing greenhouse gases by nearly 7,000 metric tons of carbon dioxide equivalents (equal to the emissions from 16 million miles of vehicular traffic each year)
- Providing scalable, replicable recycling programs for regional schools and the general public
- Giving public staff and elected officials the tools to become topic experts and actively support new programming
- Engaging numerous public, private and non-profit partners in a successful effort to conserve resources and raise awareness about the San Luis Valley's precious environment

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SECTION 1.0
BACKGROUND

1.1 Study Background and Purpose

The San Luis Valley Ecosystem Council (SLVEC) and Conejos Clean Water (CCW) organizations have partnered to conduct a grant-funded waste diversion study for the San Luis Valley (SLV)[i]. The overarching vision for this study is to identify infrastructure and program improvements that will catalyze more successful diversion of the municipal solid waste (MSW[ii]) stream in the valley.

This is a feasibility-level study that considers the gap between the existing regional MSW system and future objectives, prioritizes the most advantageous improvement options and conceptualizes what these options include. Costs and implementation needs are also considered. The findings are structured to support future final design and funding allocation efforts that will follow this study.

1.1.1 Planning Area and Planning Period

The SLV encompasses Alamosa, Conejos, Costilla, Mineral, Rio Grande and Saguache Counties. Stakeholders who operate in, serve or support waste management in all six counties were encouraged to participate in the study. Alamosa, Conejos, Costilla, Rio Grande and Saguache Counties have been the most active in the process.

Pictured at right: unsorted MSW at the 2017 waste audit (top), cardboard awaiting baling at the Waste Free SLV drop site in Saguache, Ace in Your Pocket recycling equipment (Peters, bottom)

Table 1-1 summarizes the current and population and waste generation rates. The planning area has a population density of less than 6 persons per square mile, which does not support curbside recyclables collection for much of the valley.

Mineral County Project:

Mineral County & it's stakeholders did not actively participate in this study. The county's primary hauler, MDS Waste & Recycle, is currently enhancing its recycling facility in Creede and has purchased equipment for single-stream recycling drop sites in Mineral and Rio Grande Counties. It is unknown whether these sites will ultimately be constructed, but recyclables are expected to be aggregated at the Creede hub and transferred to the Front Range for single-stream processing.

Table 1-1
Current and Projected Population and MSW Quantities[iii]

	2016	*2027*
POPULATION	46,400	50,100
WASTE GENERATION	39,400	42,400

The planning period of this study encompasses the next ten years (2027). In general, the first half of the planning period references present time through 2022, and the second half from 2023 through 2027.

1.1.2 Planning Process

The planning process was driven by SLVEC/CCW with assistance from LBA Associates. It has included:

- Convening a Waste Diversion Task Force – including representative hauling companies, recycling organizations, landfills, non-profits, local governments, businesses and citizens
- Researching existing facilities, programs, stakeholders and quantities – which were used to understand the baseline MSW system(s)
- Conducting a trash composition audit – to assess the recyclables and organics currently disposed
- Consulting with Task Force and regional stakeholders – to identify obstacles and opportunities and assess the gap between existing and future needs
- Researching the potential environmental and cost benefits of the most promising improvements
- Sharing findings with Task Force and regional stakeholders

1.2 EXISTING SYSTEM

SLVEC/CCW conducted an exhaustive public process to build an active Waste Diversion Task Force, conduct baseline system research and pursue diversion improvements that have the support of SLV stakeholders. During

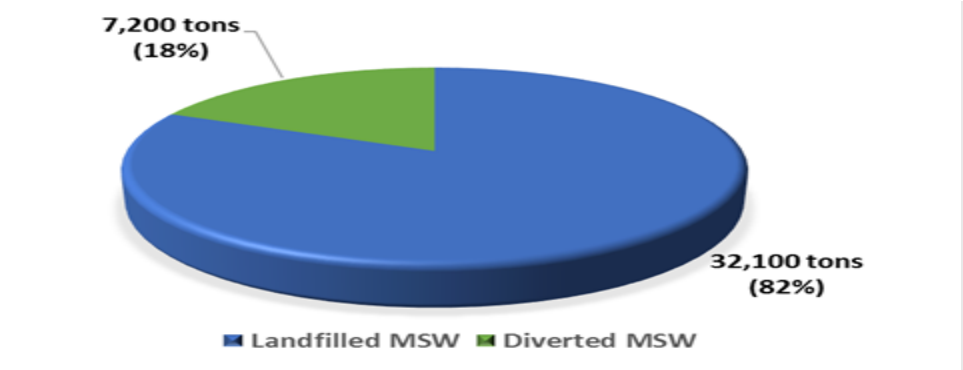
this study, numerous surveys and meetings were held to obtain data and discuss options (SLVEC and CCW have been engaging the public in solid waste issues since 2014, however, when they began work to mitigate illegal dumping in the valley.

1.2.1 Current Facilities, Services and Policies

The current MSW system can be described as follows[iv]:

1) ***MSW Generation*** - Total MSW quantities were estimated to be approximately 40,000 tons/year in 2016, of which 82% was disposed in 2016 and 18% was diverted through recycling, organics recovery and special waste management programs (see Figure 1-1). This equates to a generation rate of about 4.7 pounds of MSW per capita-day (significantly lower than the state average of 9.6 pounds/capita-day[v]).
2) ***Hauler Operations*** - About 15 haulers serve the region. Most are private, for-profit companies (the City of Alamosa and Town of Antonito are the exceptions) and most collect trash only (MDS, Ace in Your Pocket and Waste-Free San Luis Valley also collect recyclables). Monthly residential curbside trash collection pricing ranges from $18 to $30 per household.
3) ***Landfill Operations*** - Three landfills serve the valley including the San Luis Valley Regional Solid Waste Authority (SLVRSWA) landfill, which manages more than 90% of the region's MSW. The Saguache County and Mineral County landfills manage the remaining 10%. Landfill tip fees for commercial compacted loads range $14 to $18/ton.
4) ***Recyclables Collection*** - Public recycling in the region is limited to three drop site locations and curbside service by MDS (single-stream) and Waste-Free (source-separated. The City of Alamosa operates the Rickey Recycling Center (RRC) which includes public drop-off collection and baling of several traditional, source-separated materials for transfer to end markets. Other organizations accept and/or collect discrete materials, such as the Habitat for Humanity (used building materials) and WSB Electronics.
5) ***Policy*** - There are no diversion-specific public policies in the region. Alamosa, Antonito and Monte Vista require their residents to have curbside trash collection service, however.

Figure 1-1
2016 MSW Disposition (percent by weight)



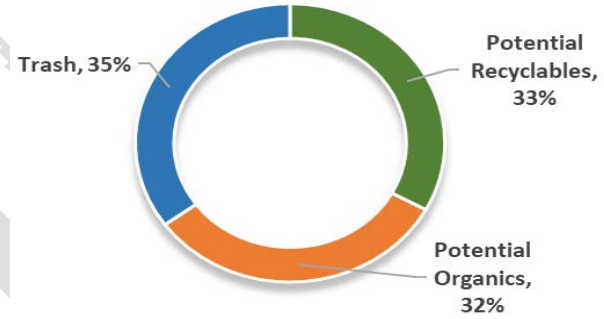
1.2.2 Waste Composition

SLVEC/CCW staff and Waste Diversion Task Force members also conducted an abbreviated waste composition audit on MSW samples collected at the SLVRSWA landfill[vi]. The main finding was that one-third of the samples could have been recycled (see Figure 1-2):

Key Waste Audit Findings:

- **33% paper, plastic, metal, glass and electronic materials that could have been diverted through existing programs**
- **32% organics materials potentially recovered in the future through expanded food donation, animal feed and new compost operations**

Figure 1-2
1.1. Potential for Diversion (percent by weight)



Key to the interpretation of audit findings is the caveat that these results represent a very brief snapshot of trash content; they were collected over only two days in May 2017 and sorted only seven samples at one of the region's three landfills. The results should be used as a general guide to MSW composition only.

Pictured above is the May 2017 waste audit team (Vargas, Miani, Enquist, Barker, Underwood, Canaly, Crowder, Rossi

1.3 WASTE DIVERSION GAPS

While the regional stakeholder discussions held early in the study did not identify quantifiable waste diversion goals, the following objectives for the 10-year planning period were identified:

- **Increase regional MSW diversion beyond the existing 18%**[vii]
- **Be feasible in terms of cost and public acceptance**
- **Add/expand existing facilities and programs that are both environmentally and economically sustainable**
- **Support existing businesses (especially haulers)**

Using the baseline system data and these objectives as guidance, a universe of potential waste improvement options was developed (see Appendix A) and screened to determine those options with the greatest potential for achieving stakeholder goals. Ultimately, SLVEC, CCW and the Task Force selected the following three "best bang for the buck" options for further study:

1) ***Recyclable and Trash Drop Site Collection System*** – This option was intended to increase recycling access without exacerbating illegal dumping issues and was based on a model facility that can be replicated throughout.
2) ***Improvements to RRC*** – These will accommodate increased quantities associated with the drop site and school collection programs and create processing efficiencies associated with baling and bale management at the facility.
3) ***Education Programs*** - Targeted to the North Conejos High School (as a model for other schools within and beyond the district) and to public staff/ elected officials throughout the region, this program will promote a culture shift community-wide and support a better understanding of the value of waste diversion.

These options are the subject of Section 2.0, 3.0 and 4.0, respectively. The final chapter of this report, Section 5.0 considers final recommendations and an overall implementation strategy.

1.4 STUDY LIMITATIONS

There are several limitations to the SLV waste diversion study:

- ➔ Analysis of Three Options - While there are numerous options for increasing waste diversion in the SLV, grant project was restricted to three options considered to have the greatest potential for advancing waste diversion over the long term. This selection meant that the diversion of food, yard, electronic, agricultural and other waste materials were not studied, but instead left for evaluation at a future date.
- ➔ Future Program Implementation – As this is a feasibility-level study, no construction, program development, equipment purchase, property selection or funding pursuits were completed.

- Data Limitations - The lack of detailed quantity, composition and cost data restricted the analytical definitiveness of the study. All findings reported in this document should be used judiciously. Ideally, updated and improved data will be obtained and appropriately reviewed and verified before any program is implemented.
- City of Alamosa System Changes – The city's on-going evaluation of future residential single-stream recycling service is outside the scope of this study. As any new service will not be confirmed or developed during this work, the impact on RRC and the programs considered in the study are unknown and may require program concepts and cost analyses to be re-estimated.
- MDS Collection Improvements – Due to a lack of communication between Mineral County, MDS and SLVEC/CCW, it is not known what these improvements will entail and when (or if) they will ultimately be developed. Like the Alamosa program changes, their potential impact on the programs described in this study cannot be evaluated at this time.

SECTION 2.0
WASTE DIVERSION IMPROVEMENT: REGIONAL RECYCLING and TRASH DROP SITES

This improvement considers a network of combined recycling and trash collection facilities throughout the SLV with the objectives of:

- **Generating increased recycling through better access**
- **Decreasing illegal dumping through more convenient and affordable trash disposal**
- **Maintaining economical operations**

2.1 CONCEPT

To evaluate this improvement, a facility model was developed to evaluate a drop site installed virtually anywhere in the valley and provide scalable infrastructure to serve multiple communities. The design concept for this model has been successfully employed at multiple Lake and Grand County sites,[viii] serving both low-density rural and variable seasonal populations. The functionality of this concept includes:

- Operational flexibility to accommodate changes in quantities, public hours and staffing
- Equipment that local haulers can service
- Ability to adapt to small locations without electricity or 24/7 staffing
- Compatibility with the local recycling hub, (the Rickey Recycling Center or RRC)
- One alternative for break-even financial operations that are affordable to the public

Pictured above: baled recyclables at RRC (top), collected cardboard at Saguache Landfill and pre-paid bag trash drop site in Grand Lake (bottom)

2.1.1 Sizing

Identification of actual drop site locations is beyond the scope of this study. To estimate model drop site needs, however, a list of preliminary of unvetted sites was used (see Appendix B). Until the location of future drop sites has been determined, it is challenging to establish design capacity. The following range is suggested:

1) ***Low Usage*** – This smaller site can represent a small permanent population that generates modest recycling and trash quantities.
2) ***Average Usage*** – This site size can represent an average population including some seasonal users.
3) ***High Usage*** – The high usage estimate can represent a large population with high seasonal use, generating high recycling and trash quantities. Because this level includes peak populations assumed for high tourist seasons, it likely over-estimates annual operations.

For this study, the low and average usage levels are relied upon to reflect drop site capacity and resource needs. Assumptions are based on very limited data – the estimates should be used judiciously for planning purposes and verified for actual operations.

Recyclables - The RRC, which is the facility targeted to receive the drop site recyclables for baling and shipping to end markets, is currently a source-separated facility that does not have the capacity to sort commingled materials. To be compatible with the RRC, the drop sites will only accept recyclables that are sorted by material type. This approach will require a separate bin(s) for each recyclable.

City of Alamosa Consideration of Residential Curbside Single-Stream Service:

In 2017, the city began considering this option which may cause a conversion of the RRC from a source-separated recycling to a single-stream facility. This change could allow the drop sites to in turn collect fully commingled materials, thereby reducing both capital and operating costs (but also reducing material quality to some extent). The new city service will not be approved or implemented until at least 2018 and probably later (if at all).

To minimize site size and hauling costs, it is recommended that only a few materials be collected initially (i.e., cardboard/chipboard, PET plastic #1, HDPE plastic #2 natural, HDPE plastic #2 colored, aluminum beverage containers and steel containers). Table 2-1 (next page) provides an estimated number of tons for sites developed over the planning period and the tonnage impact on the RRC.

Table 2-1
Annual Recyclable Quantities

	Low Use Tons[a]	*Average Use Tons*[a]	*Quantity Impact on RRC (% of current tonnage)*
Single Drop Site	35	90	9% (low) – 23% (average)
Up to Ten Total Drop Sites	350	900	89% (low) – 228% (average)

[a] Estimates need to be verified for actual operation

Trash – It is expected that trash collected at the drop sites will primarily be hauled to the SLVRSWA, although sites ultimately located in Saguache County may be hauled to the county landfill[ix]. Only MSW that is currently accepted at these landfills will be accepted at the drop sites; this excludes banned motor vehicle and electronic wastes, as well as hazardous materials. Unlike recyclables, a single container (or multiple containers all collecting trash) can be used.

Table 2-2 summarizes assumes that use by trash customers will be less than by recyclers given the current operation of trash-only drop sites and curbside services in some municipalities and outlying county areas (additional detail is provided in Appendix C).

Table 2-2
Annual Trash Tons[a]

	Low Use	*Average Use*
Single Drop Site	240	400
Up to Ten Total Drop Sites	2,400	4,000

[a] Estimates need to be verified for actual operation

2.1.2 Components

Table 2-3 (next page) summarizes suggested infrastructure and operational components for the model drop site. The flexibility of this facility design and operations will be critical for accommodating ultimate participation levels and quantities managed both in the short- and long-term.

Infrastructure – Future SLV drop sites can be temporary, unstaffed facilities that include only a recyclables/trash container. However, this approach - while low cost - has the potential for blowing litter, uncontrolled traffic, unsafe conditions and property damage when collection vehicles access sites without a constructed base. These sites may be suitable for some valley locations on a short-term basis. *However, this study considers a facility model that avoids these pitfalls and evaluates a permanent drop site for the collection of source-separated materials* (options for reducing costs are described in the side bar on page 13).

The model concept includes a compacted aggregate surface, fenced to contain blowing litter, surveillance to remotely track non-compliance and well-signed material storage containers. It is expected that drop sites will be located on property provided by local governments/stakeholders and will be relatively flat, close to

other activities to discourage misuse and have appropriate lighting for safety. Figure 2-1 (next page) includes a conceptual site plan of the model site that is expected to require roughly 0.15 acres.

Table 2-3
Drop Site Components

Staffing	• Recyclables – on-site staff & off-site RRC/site misuse management • Trash – unstaffed if collected outside of recycling hours
Hours	• Recyclables – during staffed hours only (e.g., 9-10 hours/week), which can be adjusted over time • Trash – up to 24/7
Security	• Surveillance – mounted, wireless cameras with remote viewing) • Metal fencing & gates – to control blowing litter
Containers	• Recyclables - 10-cubic yard trailered container hauled by pick-up • Trash - 6-cubic yard Dumpsters provided by hauler
Customer Bags	• Recyclables – dropped in any containers except plastic bags (are a contaminant in recycling) • Trash – must drop in designated pre-paid plastic bags
Hauling	• Private hauling of trash and recyclables in "milk run" system • Recyclables hauled to Rickey RRC • Trash hauled to SLVRSWA or Saguache County Landfill
Maintenance	• During recycling hours – to manage overflows, litter, enforcement

The primary drop site equipment will be the recycling and trash containers. There are several container options with advantages that vary depending on total quantities, level of source-separation and available hauler equipment, as shown in Table 2-4 (on page 12). Given the need for source-separation, trailered recyclable roll-offs are recommended for initial recyclables collection. The majority of existing haulers in the valley (including several small haulers) can service these containers.

Operations – The drop site is designed to be low-maintenance. Recyclables collection at the drop site should be limited to those hours when staff or volunteers are present to minimize contamination (which can lead to reduced material quality and increased tip fees at the RRC). Trash collection can range from the same limited hours as recycling to an unlimited 24/7 schedule to best accommodate customer needs. Additional activities will include general maintenance and addressing any site misuse.

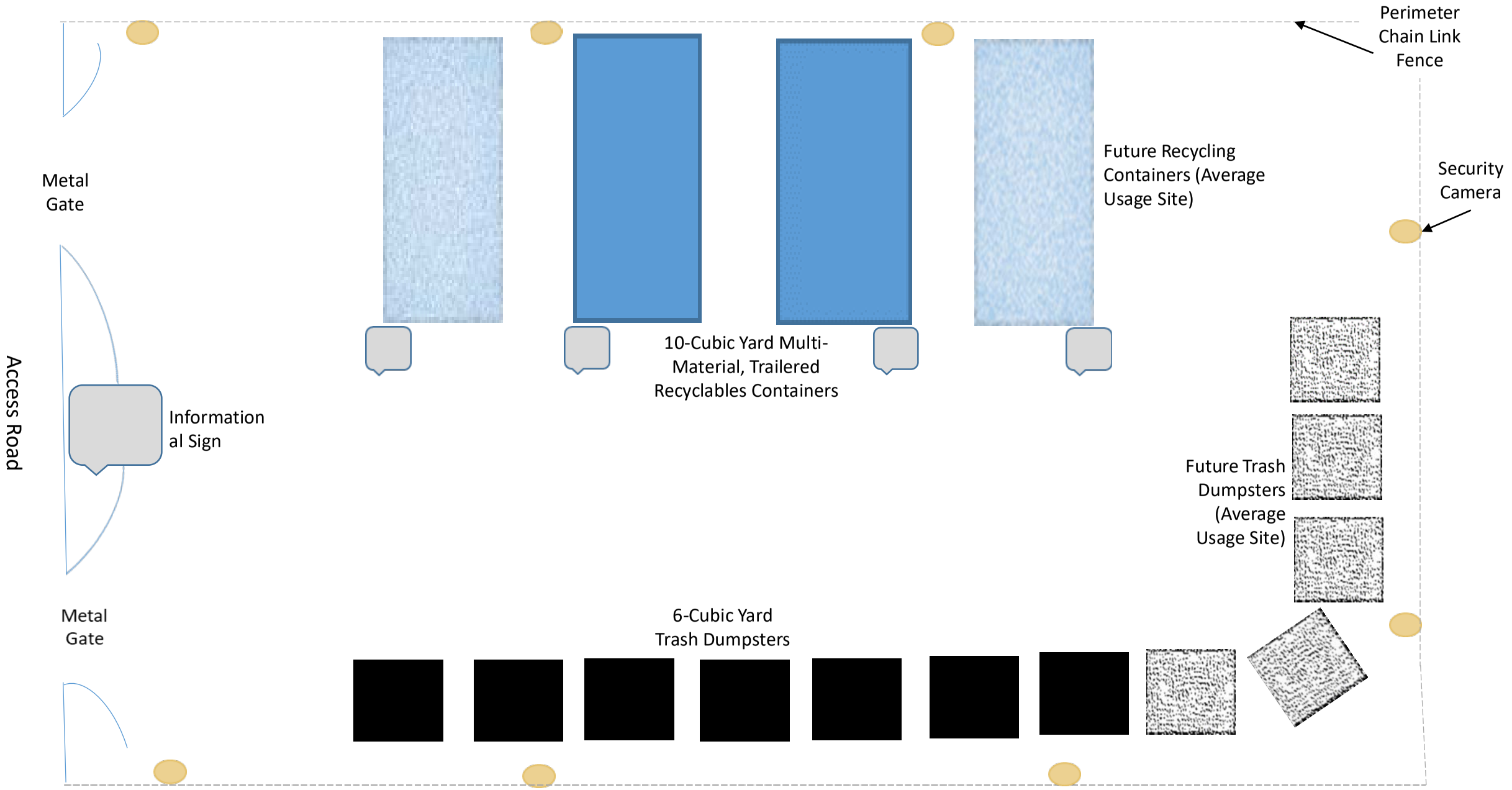


Figure 2-1
Conceptual Regional Recyclables & Trash Drop Site Layout (not to scale)

Table 2-4
Recycling and Trash Container Options

Container Options	Advantages	Disadvantages	Recommendations
Dumpsters	• Hauled by front- or rear-load compaction trucks – many Dumpsters can be serviced by one truck trip • Many SLV haulers use for trash collection • Don't require round-trip travel with empty container • Can be the cheapest option	• Not as suitable for source-separated material (need separate Dumpster & truck for each recyclable) • Dumpster service for recyclables not feasible with current equipment for some existing haulers (based on 4 out of 7 surveyed haulers)	• Utilize for trash collection require hauler to provide in collection contract) • Utilize for recyclables if switched to single-stream & interested hauler(s) • Take advantage of flexibility to accommodate variable trash tons
Roll-Offs	• Can store more volume per container on-site • Can have single- or multi-material bins • Many SLV haulers can service	• Don't provide compaction • Require roll-off truck/hoist • Need more room for on-site maneuvering • Requires round-trip travel with empty container	• Can be used for recyclables if RRC & drop sites switch to single-stream (but Dumpsters have lower cost)
Trailered Roll-Offs	• Can be hauled by ¾-ton pickup with standard ball hitch (most SLV haulers can service) • Can have single- or multi-material bins • Manual unloading of small bins allows more control at hub	• Requires round-trip travel with empty container • Requires manual unloading (more driver & hub time) • More expensive to purchase & operate than standard roll-offs	• Utilize for source-separated recyclables (retrofit to single-bin if system switches to single-stream)
Compactors	• Can reduce on-site container size and hauling costs for recyclables & trash • Can also be trailered	• Safety issues at unstaffed sites • 2-3 times more expensive than non-compaction units	• Consider for source-separated recyclables in future if quantities justify & operations can support

2.2 Costs and Revenues

It is assumed that grant, foundation or other external funding will be obtained for regional drop site capitalization, but the operational costs will be off-set by user fees, taxes and/or other revenue sources.

Costs - Table 2-5 (next page) includes capital and operating costs for a single low- and average-usage drop site (see Appendix D for additional details). The table allows two notable observations. There is a cost advantage of managing a larger quantity of materials; for example, annual operating costs decrease from about $300 to $200/ton at the low- and average-usage sites, respectively[x]. Secondly, it shows that recycling is a more expensive operation than trash on a per-ton basis due to the need to purchase - and the lower payload of - the recycling containers, the need to haul empty containers back from RRC and the higher RRC

tip fee (which has been estimated by the city to be about $50/ton[xi] versus the established $18/ton fee at the SLVRSWA Landfill).

Table 2-5
Estimated Costs Per Drop Site (2017$)

Tons/Year of Combined Recyclables & Trash		*Low Usage (275 tpy)*	*Average Usage (490 tpy)*
Capital Cost[a]	Land Purchase	$0	$0
	Site Preparation & Signage	$8,000	$8,000
	Trailered Recycling Containers	$44,000	$88,000
	Trash Dumpsters[c]	$0	$0
	Fencing/Gates & Surveillance	$14,000	$14,000
	Total Capital Costs	$66,000	$110,000
Annual Operating Costs[b]	Maintenance	$2,000	$3,000
	Owner Labor	$37,000	$37,000
	Contract Hauler – Recycling	$18,000	$25,000
	Contract Hauler – Trash	$17,000	$20,000
	Trash Bag Purchase	$6,000	$10,000
	Total Operation Costs	$80,000	$95,000

[a] Excludes land purchase (0.15-acres/site), site selection/development, permitting, compliance with local rules, site lighting, grant pursuit and hauler procurement

[b] Includes tip fees at RRC/SLVRSWA landfill

[c] Assumes Dumpsters are provided by hauler (amortized costs are included in Annual Operating Costs)

Opportunities for Lower Costs:

- $ *Some existing locations may not require grading or fencing – this could reduce capital costs by 24% (i.e., from the $64,000 estimated in Table 2-5 for a low-usage site to $49,000 for a low-usage site)*
- $ *Some may utilize Dumpsters, roll-offs, boxes or other containers for recycling that are provided by the hauler (i.e., amortized instead of purchased outright) or available at no cost – this could reduce capital costs by 65% (i.e., from $64,000 to $22,000 for a low-usage site) and operating costs by 8% (i.e., from $80,000 to $74,000)*
- $ *Some drop sites may collect recyclables only and not require trash Dumpsters or hauler service – this could reduce operating costs by 29% (i.e., from $80,000 to $57,000)*
- $ *Increased participation to increase tons collected – this could reduce operating costs by 35% (i.e., from about $300 to $200/ton)*
- $ *Purchase equipment for multiple drop sites at one time – site development contractors and container vendors quoted slight discounts if five or more facilities are constructed at the same time*

Revenues - To be economically viable over the planning period, revenue sources are needed to off-set capital and operating costs.

1) ***RREO Infrastructure Grants*** - The State of Colorado grants provide funding for capital and some first-year operating costs ($7.1M have been awarded since 2008). This resource could be applied to site preparation, container purchase, hauler procurement, initial hauling costs and staffing (depending on the grant category). These applications are typically due in March and expenditures must be completed between July of the same year and June of the next year.

2) ***Material Rebates*** - The RREO grants can also be secured for recycling programs available to the public that offers free drop-site collection of at least two materials. These funds can off-set annual recycling hauling; in the FY2017 successful applicants received an average $10,000 in rebates. Applications are due in August for operations conducted during the previous July/June fiscal year.

3) ***Donations*** – Donations are an easy way to generate additional revenues to help off-set recycling costs; they can be any amount and are strictly voluntary. The Grand Resource & Recycling Coalition uses this approach at its Granby recycling drop site, and covers roughly two-thirds of its operating cost[xii]. If each drop site suggests a $2 donation per visit, revenues could range from $5,000 to $10,000/year[xiii].

4) ***Sponsorships*** - It is also possible that business sponsors be solicited in exchange for placing their brand/logo at the drop site. Sponsor dollars can range widely depending on how sponsorship is structured. For example, small businesses could sponsor a specific container, while larger supporters could be an overall sponsor. Sponsorships cannot be easily quantified and will likely need to be repeatedly secured on an annual basis (contract haulers can and often do provide sponsorships in addition to their hauling service).

5) ***In-Kind Costs*** – Some site management could potentially be provided by volunteers, local high school students (such as the North Conejos High School Recycling Club), community service volunteers, or others. While this site management may be less reliable than with paid staffing, it could notably reduce the labor component of annual operating costs.

6) ***Drop Site User Fees*** – User fees are service-specific and assessed directly to those who use each drop site. One increasingly common type of drop site user fee in Colorado is a pre-paid trash bag system. This method is used successfully in Lake County (three drop site facilities) and Grand County (two facilities). This system can be a reliable source of funding for both recycling and trash collection and can also create an incentive for recycling while establishing an equitable fee system for trash disposed.[xiv, xv] See the sidebar on the next page for more information on this funding alternative.

7) ***Other Funding Sources*** – Other sources that SLVEC/CCW has already begun working to develop on behalf of future program owners include Colorado Department of Local Affairs' Rural Economic Development Initiation funding and tax assessments (Costilla County is currently considering a mill levy approach to generate funding for overall solid waste management services including a local drop site).

<u>One Funding Option for Recycling/Trash Drop Sites =</u>
<u>Pre-Paid Trash Bags</u>

Based on the estimated serviced area populations for trash collection (see Appendix C), it is projected that customers would use between 19,000 and 26,000 bags per year. As shown below, a sales price of $4 to $5/bag would be needed initially to off-set the annual operating cost of the drop sites with a constructed base, fencing and surveillance (shown in Table 2-5). The bag price could be reduced to $3 to $4/bag for higher usage sites, or if additional revenue sources are obtained. These prices equate to:

- ***$3 to $4/bag – equals about $26 to $34/household-month for <u>both</u> trash and recycling***
- ***$4 to $5/bag – equals about $32 and $40/household-month for <u>both</u> trash and recycling***

These monthly costs and compare to the $18 to $30/month paid by those residents currently for <u>trash-only</u> curbside collection.

Potential Annual Trash Bag Revenues (2017$)

Bag Sales Price to Customers	Low Usage	Average Usage
$3/Bag	$57,000	$78,000
$4/Bag	$76,000	$104,000
$5/Bag	$95,000	$130,000

Trash bags would ideally be sold to drop site customers at convenient locations like local retailers (who in turn would benefit by drawing customers to their location) as well as city/town halls and property management offices. Drop sites that are developed for recycling-only would not earn revenues from pre-paid trash bags.

2.3 Implementation Considerations

➔ <u>RRC Expansion Critical to Drop Site System</u> – The drop site system feasibility is dependent on the ability to deliver collected recyclables to the RRC. As the drop site system increases the facility's baling needs by two to three times over the planning period, equipment improvements and staff increases will be needed. It is expected that the city will partner in any funding pursuit.

➔ <u>Drop Site System Ownership</u> – It is unknown whether the SLVEC/CCW team or other organization(s) will ultimately take ownership of the drop site system and serve as grantee for future grant funding. A single owner is recommended to i) collect the same materials in the same way across the valley (consistency reduces the public's frustration), ii) use the same hauler(s) and earn cost reductions from the economy of scale, and iii) minimize staff cost by managing multiple facilities. Options for centralized management:

⇒ An existing non-profit organization such as SLVEC, CCW or the SLV Council of Governments – these organizations have the benefit of existing relationships with most of the local government and environmental groups in the valley, although their mission

and resources of these organizations may require action by their respective board of directors to accommodate drop site programming

- ⇒ The existing SLVRSWA – similarly, this authority's mission is landfill operation and would require significant expansion
- ⇒ An existing local public agency – however, most municipalities and counties will not want to accept the liability of providing services outside their jurisdiction
- ⇒ A new public organization such as an intergovernmental agency (may have funding limitations and challenges supporting long-term services) or a joint powers authority (stand-alone, formal entity with the ability to own/operate facilities, enter into service contracts, incur debt and receive assets but also adds a new layer of governance, requires employees and can incur liability) – both can obtain funding from government members

➔ RREO Grant Funding – A Tier 1 hub-and-spoke RREO grant requires two spokes and one hub (can include retrofitting existing facilities) but staff labor ($37,000 estimated for initial site) reimbursement is excluded. Alternatives include moving site maintenance/operational responsibilities to the hauler (first-year contractor costs are typically reimbursed) or pursue a Tier II grant (CDPHE has historically awarded roughly and equal number of Tier 1 and 2 grants).

➔ Drop Site Only Use for Recycling Only – As there are at least five trash transfer/self-haul landfill locations in the valley as well as multiple curbside collection programs, it is probable that customers served by drop sites located near these programs will not require trash collection. If any of the drop sites are developed for recycling only, the capital and operating cost would be significantly reduced. However, trash bag sales revenue will also be eliminated and will require that other sources of funding be developed. Additionally, staff will need to haul any blowing litter and illegally dumped material off site.

➔ On-Going Changes in Recycling & Trash Streams – There are significant variables associated with future drop site collection in the SLV. To accommodate these variables, it is recommended that a small number of drop sites be developed early in the planning period to judge:

- ⇒ The container number and hauler pull frequency of a 10-cubic yard recycling container and 6-cubic yard trash Dumpsters which may vary between shoulder and tourist seasons
- ⇒ Overall site hours (trash collection may be allowed 24/7 or may be limited to control access and site misuse)
- ⇒ Modifications to the hauler contract(s) to address material, container, collection frequency or other issues[xvi]
- ⇒ Adjustments to staffing needs for recycling hours and site maintenance
- ⇒ Surveillance and response to illegal dumping or misuse of the site
- ⇒ Coordination with businesses or homes that may be located near the site, waste service providers in the area, local governments and the RRC

As the program matures, potential improvements to materials management that better control costs could be considered;

⇒ Changing collection to single-stream in tandem with future City of Alamosa curbside services changes if applicable (see the sidebar below for the advantages and disadvantages of source-separated versus single-stream recyclables collection)

⇒ Adding additional materials accepted at the RRC (e.g., newspaper, office paper, chipboard, magazines, glass)

⇒ Replacing aggregate with concrete pad to minimize maintenance of heavily-used sites

⇒ Collecting cardboard and/or plastics in a separate compaction unit at more heavily used sites to reduce site storage needs and improve transportation economics (unless the change to Dumpsters has been made and compaction is provided by hauler collection vehicles) – compaction requires new and costlier equipment and public safety measures)[xvii]

⇒ Continue to evaluate use, value and economics – and add additional sites to provide reasonable recycling and trash collection access throughout the valley

Comparison of Source-Separated & Single-Stream Recycling:

COMMINGLED OPTION	*ADVANTAGES*	*DISADVANTAGES*	*RECOMMENDATIONS*
SOURCE-SEPARATED	• Cleaner, more valuable materials • Requires customer commitment • Does not require sorting (possibly baling)	• Less convenient for customers • Lower quantities recycled • Most expensive to collect (curbside or drop site)	• Develop source-separated program as long as hub is accepting source-separated materials
SINGLE-STREAM	• More convenient for customers • Greater quantities recycled • Western part of SLV already single-steam (provides consistency) • Costs less to collect	• More contamination /less valuable materials (controlled in part at staffed sites) • Requires sorting	• Re-evaluate viability of single-stream drop sites if hub switches to single-stream

➔ Ultimate Drop Site Locations - Considerations for future sites should include:

⇒ Available property donated for the life of the site

⇒ Level property that is well-lit, provides easy access for users and is near other public or commercial activities to minimize misuse

⇒ Assessment of value as recycling and trash drop site or trash only (if applicable)

⇒ If and when Mineral County/MDW Waste & Recycling establishes new single-stream recycling drop sites in the western part of the valley, the list of potential SLVEC/CCW sites would be refocused to the central and eastern part of the region

➔ Enforce Site Rules – These should be established by the owner and be consistent with local rule-making. They should include a requirement for pre-paid bags for all trash, restriction on unacceptable materials in recycling and prohibition on all illegal dumping. The ability to apply financial penalties will depend on the owner's legal authority, the adequacy of misuse proof and the willingness of local courts to purse (surveillance cameras are intended to capture video of violations). Table 2-5 staffing costs include non-legal enforcement actions such as identifying violators, issuing warnings and coordinating with local law enforcement as appropriate.

SECTION 3.0
WASTE DIVERSION IMPROVEMENT: RICKEY RECYCLING CENTER ENHANCEMENTS

This improvement focuses on enhancements to the RRC that are needed to process the additional recyclables that will be generated from the regional recycling/trash drop sites described in Section 2.0. Objectives include:

- *Adding infrastructure and labor to accommodate new drop site & school tons*
- *Improve the efficiency of baling operations*
- *Maintain the quality of recyclables and market revenues earned*

3.1 RRC FACILITY

The facility is located in the City of Alamosa and includes a public drop site for traditional recyclables, enclosed processing and equipment, a small office building and yard waste collection area. There is also additional acreage for storage and future expansion.

3.1.1 Current Operations

In 2016, the RRC processed approximately 500 tons of recyclables including paper (cardboard, newspaper, office paper, chipboard); plastics (PET, HDPE natural, HDPE colored), aluminum cans; steel containers; and glass. All materials were baled and hauled to off-site markets except glass, which is crushed and stored for the city's use on utilities and roads. Only source-separated materials are accepted; the center does not currently have sorting capacity.

Pictured at right is the RRC entrance sign (top), baler and bale loading by Ace in Your Pocket(bottom)

The RRC is operated as part of the city's utility enterprise fund. The fund budget covers drop site, processing and mobile equipment operations. RRC-specific costs and user fees are not broken down separately from waste and sewer costs/fees, however, and were not available for this analysis. In 2016, these costs were estimated to be about $90,000 including $63,000 in salary costs. The city partners with a privately-owned company to haul and market baled materials to end users in Colorado and beyond; the partnership has historically earned the city revenues in the range of $15,000 to $20,000/year[xviii].

3.1.2 Future Needs

City management and its marketing partner[xix] have noted the following RRC needs, which will likely be exacerbated by the addition of new tons form the drop site system and school programs (discussed in Section 4.0):

- The RRC baler is a small unit that has been adequate to date, but has been operated for over 20 years and has exceeded the typical baler design life
- Bale storage is outdoors, which has caused some degradation of fiber from moisture and bleaching by the sun - the resulting decrease in market revenue earned has not been significant but could potentially be eliminated if bales are stored under cover
- Facility staffing limits the facility's future growth - the RRC is open to the public six days a week and all functions are covered by only 1.75 full-time equivalents (FTEs) - or one full-time and one three-quarter time employee

Additionally, the City of Alamosa is considering the addition of curbside recycling service to its residents (the city already provides curbside trash collection). This is expected to be single-stream service with a corresponding modification of the RRC to a single-stream baling/transfer operation. This decision and service roll-out will not happen until at least 2018 (if approved) and as a result is not directly related to this study. Ideally, any new equipment will be able to process both source-separated and commingled materials.

3.2 COMPONENTS

Based on the RRC needs described above, the following infrastructure and operating improvements were deemed necessary to support the City of Alamosa's processing of additional recyclables. The RRC's existing throughout of 485 tons/year of traditional recyclables may be increased by as much as two to three times over the planning period (see Table 2-1 for tonnage impacts on the RRC).

3.2.1 Baling System

Given the age of the current baler and the lack of an in-floor conveyor system, a replacement system is recommended. This system should include:

- Horizontal, two-ram baler capable of baling source-separated and single-stream materials at a throughput rate ranging from two to more than nine tons/hour depending on the material baled

- A 10-foot in-floor and incline conveyor to accommodate the unloading of recycling bins and feed the baler hopper
- An automatic wire tier
- Vendor installation, start-up and staff training

It is assumed that the building foundation and electrical service will support the new equipment, but city review is needed to verify engineering, permitting and installation needs.

3.2.2 Bale Storage

While RRC's processing building has ample room for glass crushing and mobile equipment storage, there is minimal space for storing bales indoors. A low-tech option has been evaluated to store two to three trailer loads (roughly 40 bales each) of cardboard, and other fiber bales as needed (stacked three bales high). This includes a steel frame anchored into soil with 30-inch augers, a polyethylene arched structure (with one end enclosed and one end open) that is about 1,500 square feet and 15-feet tall. City review of design criteria, building permit requirements and installation needs will be needed.

3.2.3 Additional Staffing

As staffing is already limiting operations, additional labor will be required to process additional tons. Based on the estimated need for about 0.5 FTEs to bale the recyclables currently managed[xx], it is expected that anywhere from 0.4 to 1.1 FTEs would be needed to assist in manually unloading bins from the trailered recycling containers, operating and servicing the baler, and storing bales[xx].

3.3 Costs and Revenues

It is assumed that grant, foundation or other external funding will be obtained for capitalization of RRC enhancements and will likely be obtained in tandem with initial drop site funding. The cost for additional staffing at the facility to manage tonnage collected at the regional and school drop sites will be off-set by tip fees paid to the RRC.

Costs - Table 3-1 (next page) provides a summary of the infrastructure and labor costs described above. The baling system quote represents a significant investment and is likely to be required early in the planning period. It is possible that this price could be reduced with a smaller feed conveyor (nose-over only like current operations) or used equipment (not evaluated in this study).

Bale storage is a less critical investment. When a potential price decrease due to weathering of $5/bale is compared against the number of cardboard bales estimated from drop site collections over the full 10-year planning period[xxi], a benefit of less than $21,000 may be realized[xxii]. While this benefit would be increased if other fiber bales are also stored in the building, the cost/benefit ration may not justify a new building.

Table 3-1
Estimated RRC Enhancement Costs (2017$)

Baling System[a]	Baler	$203,000
	In-Floor & Incline Conveyors	$73,000
	Start-Up Wire	$1,000
	Engineering, Permitting, Foundation & Electrical Work[b]	$65,000
	Installation, Start-Up & Training	$13,000
	Total Baling System Costs	$355,000
Bale Storage[c]	Steel Frame/Fabric Building	$14,000
	Engineering, Permitting & Installation[b]	$16,000
	Total Bale Storage Costs	$30,000
Staffing[d]	One Site (Low to Average Use) – FTEs / Hrs Per Week / Salary	0.4 / 16 / $14,000
	Six Sites (Low to Average Use) – FTEs / Hrs Per Week / Salary	0.8 / 32 / $29,000
	Ten Sites (Low to Average Use) – FTEs / Hrs Per Week / Salary	1.1 / 44 / $40,000

[a] Based on quotes for Excel 2R63D (from Ultimate Specialties, Sept 2017)
[b] Assumed costs for city completion – these requirements require review and verification by city staff
[c] Based on Clear Span quote (from FarmTek, Sept 2017) – includes an estimated $12,000 for city installation
[d] Based on estimated staff allocation by the City of Alamosa and RRC employee burdened annual salary of $36,000 (includes staffing associated with tons from both drop sites and Conejos High School program)

Revenues – The RRC will earn both tip fees and market revenues from new recyclables at an estimated rate of $50/ton. Any marketing revenues currently earned from RRC materials are shared between the city and its marketing partner, and have historically ranged from about $40 to $50/ton. Overhead costs for the existing building/mobile equipment depreciation, baler parts and supplies were not available but have been broadly assumed to be generally off-set by material revenues.

3.4 Implementation Considerations

- ➔ RRC Expansion Critical to Drop Site System – Without this expansion, the City of Alamosa may find that only additional burden on its already-stressed system is unacceptable.
- ➔ RRC Ownership – RRC is owned and operated by the City of Alamosa and any enhancements would be directed accordingly. If grant funding is pursued relating to the need to manage drop site tons, however, the city will likely need to partner with the organization(s) that own that program. Given the cost of the baling system and its overlap with city-only operations, it is expected that the city would provide some in-kind funding into the grant project.
- ➔ Single-Stream Transfer Versus On-Site Processing – If/when the RRC is retrofitted to single-stream, the cost benefit of on-site single-stream sorting and direct sales to markets should be considered in comparison to a transfer-only operation to long-distance processors.[xxiii] *This assessment is outside the scope of this study, however.*
- ➔ Funding – These sources are the same as those for the drop site programs (see page 14 in Section 2.3).

SECTION 4.0
WASTE DIVERSION IMPROVMENT: EDUCATION PROGRAMS

This improvement features a two-pronged education program that targets schools and public staff/elected officials as a means of:

- *Initiating a culture shift in the region's student population that will permeate local communities*
- *Helping public leadership understand – and actively promote - the facts and value of waste diversion*

4.1 CENTAURI HIGH SCHOOL

The concept of these programs is to develop infrastructure and programming that will expand existing knowledge and participation. The school program will feature a model for the Centauri High School (CHS), which can be expanded to other schools within and beyond the North Conejos School District, and can be implemented primarily by students. The model CHS program concept includes:

- Building on the fledgling school Recycling Club already in place
- Increasing recycling levels to support dedicated recyclables collection at CHS and other schools in the district
- Providing project-based course material for pertinent science classes
- Reducing waste management costs

Pictured above are recycling containers at Centauri High School and first-place winner in the 2017 Colorado Association for Recycling student poster contest by Ashley Oh, 9th Grade, Aurora)

4.1.1 Concept

Sizing - Table 4-1 provides a summary of the student population (which is expected to be flat throughout the planning period[xxiv]) and quantity estimates for each school in the North Conejos School District[xxv]. Projected recycling potential includes all recyclables accepted at RRC. As shown, the diversion potential is about 15% by weight.

Table 4-1
North Conejos School District[a]

School	No. of Students	Total Waste	Recycling Potential[A]		Food Waste Potential[A]		Trash[A]	
		Pounds/ School Year	Pounds/ Week	Cubic Yards/ Week	Pounds/ Week	Cubic Yards/ Week	Pounds/ Week	Cubic Yards/ Week
Centauri High School	300	54,000	450	4.5	680	1.4	370	1.3
	Centauri HS Design (50% capture)		230	2.3	340	0.7	930	3.4
Other District Schools	675	121,500	1,010	10.1	1,520	3.0	850	3.1
	Other Schools (50% capture)		510	5.1	760	1.5	2,100	7.7
All District Schools	975	175,500	1,460	14.6	2,200	4.4	1,220	4.3
	All Schools (50% capture)		740	7.4	1,100	2.2	3,030	11.1

[a] Based on an assumed 50% diversion rate, one pound/student-day generation and composition values observed by other schools[xxvi]

Components - Currently there is no substantive waste diversion in the North Conejos School District beyond the management of electronic waste. CHS does have a small recycling program; a two-student Recycling Club collects cardboard, mixed paper, plastic bottles, aluminum and steel cans for delivery to RRC. Quantities are unknown but observed to be low. Table 4-2 (next page) outlines potential program components.

Table 4-2
CHS Program Components

Recycling Club & Student Participation	Leverage existing clubs and classes to develop a group of students whose club, class and volunteer responsibilities include operating the recycling depot and promoting waste diversion school-wide
Recycling Depot	To expand the existing recycling program to accommodate recyclables that increase diversion, decrease trash costs and provide a foundation for recycling at other district schools
Course & Project Content	To provide all students with a working knowledge of waste diversion practices & benefits, as well as motivation to actively participate in waste diversion

1) ***Recycling Club & Student Participation*** – To make a school-wide diversion program effective and to leverage student action and minimize costs, student participation needs to include both a strong working group and a student body committed to supporting programs. As the Recycling Club already exists and has an advisor, building future CHS waste diversion efforts around the passion and commitment of current members is an ideal foundation. Recommended activities for club members are listed below. *All activities assume oversight and approval by the club advisor, teachers, custodial and administrative staff as well as parents as appropriate.*

   - Formalize club;
     - Establish leaders, governing rules and appropriate approvals
     - Expand membership – through overlaps with other clubs (e.g., the National Honor Society and Student Council) and classes (e.g., the physical and earth science classes)
     - Reward outstanding participation – through gifts obtained by sponsor(s) such as a gift card, gas card or similar
   - Assume day-to-day responsibility of the recycling depot as noted below
   - Work to augment the five satellite collection containers currently in place with "in room" recycling bins in classrooms, offices, copy/central meeting areas, library, cafeteria, extra-curricular areas, etc.– e.g., small 18-gallon bins with clear labelling (alternatively, some trash containers may be changed to recycling with new labels)
   - Post, maintain and update promotional materials ("did-you-know" posters and "how-to" signage) school-wide and at trash/recycling containers - ideally these materials will be part of a larger branding and outreach campaign to improve overall waste diversion successes in the school[xxvii] (should be coordinated with SLV branding efforts described in Section 5.3)
   - Sponsor an art contest to find colorful messaging that brands the program and decorates recycling depot bins, indoor containers, posters and signage

- Implement at least one campaign during the school year that helps the student body understand the value of diversion and their role (e.g., a "Stop Styrofoam" campaign[xxviii] or programs that target single-use water bottles, disposal cups/plates/utensils, milk cartons, locker debris or other materials)
- Report program results[xxix] – so students and staff have timely feedback that shows successes and areas for further improvement (regular social media posts and large "recycling thermometers" posted in the school lobby work well)

2) ***Recycling Depot Infrastructure and Operation*** – A new high school recycling depot should be located where it is visible to students and parents, but convenient to custodial staff and fenced to control blowing litter and general aesthetics; this may be at the current trash Dumpster location. Ideally, the CHS depot will be developed and operated in tandem with the multi-drop site system described in Section 2.0 (i.e., a similar collection system and the same hauler to control costs). Like the rural sites, it should collect cardboard, PET, natural and colored HDPE, aluminum and steel cans initially but unlike these sites, it should include mixed paper to continue the current CHS practice (see Table 4-3 for specific operations). Accordingly, it is recommended that the trailered recycling container be used for non-cardboard recyclables and a Dumpster be used for cardboard; this provides more flexibility for this high-volume material and avoids the purchase of an additional trailered unit.

Table 4-3
CHS Recycling Depot Components

STAFFING	Unstaffed but regularly monitored by the Recycling Club
HOURS	School hours (school use only)
SECURITY	Metal fencing & gates – to control blowing litter
CONTAINERS	10-cubic yard trailered container hauled by pick-up (6-cubic yard Dumpsters are recommended if/when RRC goes single-stream) 6-cubic yard Dumpster for cardboard collection
GENERAL MAINTENANCE	Check/clean up blowing litter and contamination Update signage as needed
HAULING	Include CHS collection in regional drop site hauler contract Quantities are unknown but trailered recyclables expected to require hauling about 1/month from CHS Trailered bin assignments can be changed to provide flexibility

3) *Course Content* – It is expected that at least five class periods would be dedicated to waste diversion in one of the science classes[xxx]. It is suggested that this content be lively, interactive and fun to maintain student interest and reward curiosity:

- Waste Diversion 101 in game show or similar attention-getting format – Content should cover what is solid waste, "environmental footprint" and other benefits of diversion over disposal, false facts about burning plastics and illegal dumping, collection and processing concepts, need for end markets, concept of environmental + economic sustainability, and the waste diversion role in the larger realm of ecosystem stewardship (should be conducted at the beginning of any course work)
- Homework assignment to measure home trash composition – conducted over a 24-hour period, students should capture and measure total quantity and type (trash, recyclables and organics), then analyze findings in class (needs to involve parents and can be repeated at end of course work to measure improvement
- Conduct a "waste free lunch contest"[xxxi] – this will help students (and parents) explore how to use re-useable containers
- Assist the Recycling Club to monitor/clean the recycling depot

Key School Recycling Benefits:

! *Programs are flexible, allowing containers, messaging and lessons learned to be easily modified and expanded over time*

! *Once the CHS program has matured and any "kinks" have been resolved, programs and materials can easily be replicated by other schools*

! *School education programs have been shown to effectively change parental and even community*

4) *Other Activities* - Science teachers may be interested in conducting waste diversion projects and conducting facility tours that expand upon class activities (but will take longer than five classes to complete):

- Conduct a waste/recycling composition audit annually by successive classes to track on-going program success, measuring[xxxii];
  - Recyclables in the trash (missed diversion opportunity)
  - Trash in the recyclables (contamination)
- Have guest lecturers for additional perspectives and interest – for example, CCW is currently guest lecturing on waste diversion practices at the Antonito Home School Consortium on a weekly basis
- Build a worm compost bin for classroom food waste – this project can use existing materials and easily acquired red worms[xxxiii] (should be passed on to subsequent classes to maintain during the school year)
- Participate in America Recycles Day (*https://americarecyclesday.org/*), the Recycling Bowl K-12 (*https://www.kab.org/recycle-bowl*), PepsiCo Recycling Rally

(*https://www.pepsicorecycling.com/programs/recyclerally*) or other events

- Green purchasing project – Have students research and present to administrative staff ways to purchase "green", re-use or re-purpose materials and conserve energy and water to minimize environmental impacts and reduce expenses
- Recycling/composting facility tours to observe full-scale operations work first-hand – e.g., the Angel of Shavano recycling center in Pagosa Springs[xxxiv], the Midway Composting Facility in Fountain[xxxv] and the Boulder County Recycling Center[xxxvi]

4.1.2 Costs and Revenues

It is assumed that grant, foundation or other external funding will be obtained for the CHS recycling depot, but operating costs would be raised on an on-going basis by the overall SLV waste diversion education program owner.

Table 4-4 (next page) summarizes estimated capital and operating costs for two scenarios; the first includes the recycling depot capital and operations cost for recyclables collected at CHS only, while the second includes the increased depot costs if CHS manages recyclables from all four North Conejos District schools (Appendix E includes additional detail). The recycling depot costs are like the model drop site, although trash collection is not included for CHS.

As requested by the North Conejos School District, Table 4-4 includes teacher, custodial and administrative labor costs for overseeing the Recycling Club, incorporating course materials and managing the depot – these constitute the bulk of operating costs. *If it were possible to build these activities into existing practices without increasing school costs (i.e., replacing other activities), annual costs could be reduced to only $6,000 (CHS only) or $9,000 (all district schools). This is a much more feasible value to maintain over time.*

It is not expected that CHS will earn recycling revenues. However, other Colorado schools have seen their trash bills drop by as much as 30%[xxxvii]. Without information concerning the service scope and costs, however, it is not possible to estimate this benefit for CHS.

Table 4-4
Estimated CHS Education Program Costs (2017$)

CHS PROGRAM COST WITH RECYCLALBES COLLECTED AT CHS ONLY			
CAPITAL COSTS	Recycling Depot	Site Development	$1,000
		Trailered Container	$22,000
		Cardboard Dumpster	$2,000
	Interior Recycling	In Room Bins	$1,000
	Total Capital Costs		$26,000
OPERATING COSTS	Owner Labor		$2,000
	School Labor		$17,000
	Hauler		$2,000
	Depot Maintenance & Promotional Materials		$2,000
	Total Operating Costs		$23,000
OPERATING COSTS WITH RECYCLABLES COLLECTED AT ALL SCHOOLS (capital costs remain same)			
OPERATING COSTS	Owner Labor		$4,000
	School Labor		$25,000
	Hauler		$3,000
	Depot Maintenance & Promotional Materials		$2,000
	Total Operating Costs		$34,000

4.1.3 Expanding to Other Schools

Other North Conejos Schools – Each school in the district can collect the same recyclables using large plastic carts for each material, then transferring them to the trailered container at the CHS recycling depot in La Jara (using buses mid-day, private vehicles or other means). To be successful, the process should also be supported by recycling bins throughout each school, posters, signage and – ideally – course work, staff and parental support (most of these materials could be modified from CHS).

Other Schools – For example, the Alamosa School District includes four schools. The Ortega Middle School and Alamosa High Schools recycle paper (both) and plastic bottles (Ortega only). These schools have the advantage of being close to RRC and served by City of Alamosa collection staff; neither has a recycling organization, however. The Alamosa district could follow the example set by the North Conejos District of student leadership that actively works to expand diversion both in practice and as part of its curricula.

4.2 Public Staff and Elected Officials

Given their long list of daily responsibilities, most public agency staff, city councils and commissions cannot give any one issue unlimited attention, which can be challenging when the issue has as many variables as solid waste management. That said, educating leaders in this arena cannot be overstated (Appendix F provides a good strategy for preparing elected officials for waste diversion improvements). To that end, this educational focus is intended to:

- Make staff and officials "topic experts" who can differentiate facts from fiction
- Provide a common understanding of diversion needs and opportunities
- Provide familiarity around this grant project's recommended improvements to generate active support "from the top" of public agencies
- Provide information (and tours) on what other Colorado communities are doing and what resources they may have to offer

Key Observation:

The ability of public leaders to embrace programming is a significant indicator of waste diversion success in the short- and long-term.

4.2.1 Components

Most city council and county commissions have some working knowledge of solid waste management in their community, but this is generally limited to trash collection and disposal. Table 4-5 (next page) outlines new program components that will build upon existing efforts.

Table 4-5
Public Staff/Elected Officials Education Program Components

Presentation Materials	Comprehensive waste diversion basics that can be developed & presented by SLVEC/CCW staff
Case Studies	General information about other Colorado programs that offer insight into how new programs were started & improved (or – equally as useful – failed)
Facility Tours	Full-scale programs that have matched economic & environmental sustainability

1) ***Presentation Materials*** – While staff and officials have limited time for a solid waste presentation (which will likely be one of multiple items on a workshop agenda), the value of delivering the information efficiently and in an attention-getting manner is as important for this audience as for the CHS students. *Jeopardy!* or similar game show structure is recommended that provides humor, encourages discussion and catalyzes the audience to learn more. *Jeopardy!* categories should include the following:

    - Parts of the Whole Part I – with answers (looking for matching questions) on solid waste, MSW, agricultural and other waste

- Hidden Treasures in SLV – with answers on existing facilities, programs and key players
- Missing Links – with answers on remaining challenges and opportunities
- Myths That Need Debunking – with answers on faulty "facts" that need correcting;
    - Recycling is free/<u>you</u> should pay <u>me!</u>
    - Recycling has more negative environmental impacts that landfilling!
    - Nobody can make recycling work with these markets!
    - Landfilling is cheap and recycling is a "waste" of time!
    - Burning is ok, too!
    - Illegal dumping is not that big a problem in SLV!
- They're My Hero! – with answers about other, relevant case studies from other Colorado programs (see the case studies list below)
- They Could Be the New Kids on the Block – with answers about the recommended diversion improvements generated from this study
- Parts of the Whole Part II – with answers about the ways staff and officials can support and follow upcoming improvements valley-wide

Jeopardy! questions and answers should be outlined in a slide presentation, to both provide a visual during delivery and a workshop take-away. The presentation should be flexible enough to refine, adjust and repeat for nearly any sized audience. Slides may also be distributed (or posted on-line) for self-tutorials.

2) ***Case Studies*** – These may be included in the presentation materials (above). Suggested examples include:

- Grand County;
    - Public drop site operated by the Grand Resource & Recycling Coalition (non-profit, donation-based)
    - Town of Grand Lake trash drop site (pre-paid bag system)
    - Town of Fraser recyclables & trash drop site (under construction in 2017, pre-paid bag system)
- Lake County – recycling & trash drop sites, school education, recycling and composting program (implemented with the non-profit Cloud City Conservation)
- Upper Arkansas Area Council of Governments – recycling drop site network
- Summit County Resource Allocation Park – public recycling drop sites, recyclables transfer station, high-altitude compost facility, household hazardous/electronic waste center and landfill
- Pitkin County Solid Waste Center – public recycling drop sites, recyclables transfer operation, high-altitude compost facility and drop 'n swap

- Southwest Colorado Council of Government communities - City of Durango trash and recyclables collection program, La Plata County recycling drop sites and Montezuma County recycling transfer/marketing operation
- St. Vrain Valley & Boulder Valley School Districts – comprehensive school education, recycling and composting programs that involved parents and communities
- Routt County – private single-stream processing facility tailored to small, rural systems[xxv]

3) ***Facility Tours*** – Site visits should include as many of the communities addressed by case study (above) and are close to most SLV locations, such as the Upper Arkansas and Lake County programs. Additional facilities that are relatively close and would provide context and reality to staff and officials include (see Section 4.1.1 for contact information):
   - Recycling/Trash Drop sites in Leadville
   - Angel of Shavano Recycling Center in Poncha Springs
   - Midway Compost Facility in Fountain

4.2.2 Costs and Revenues

It is assumed that operating costs to develop and roll out this program will be covered by grant, foundation or other external funding. While RREO Tier 1 awards can encompass education programs, there is only a one-year reimbursement period. If roll out takes longer than a year (which is likely), alternative funding will be needed.

Table 4-6 summarizes anticipated costs for development and implementing an effective education program for the public staff and elected officials throughout the valley (additional information is provided in Appendix E. It is expected that this effort will be carried out over two years and will include up to 12 presentations and 8 tours to capture as many audiences as possible.

Table 4-6
Estimated Public Staff and Elected Official Education Program Costs (2017$)

OPERATING COSTS	Owner Labor	$17,000
	Tour Expenses	$3,000
	Total Costs	$20,000

4.3 IMPLEMENTATION CONSIDERATIONS

➔ Obtain Input & Approval for the North Conejos School Program – It will be critical for the board and staff to approve the suggested components; define the role of students, administrators, teacher and custodial and staff; and obtain the resources needed for implementation.

➔ Education Programs Ownership – While each school or district will own and implement school programs, it is recommended that a single overarching owner provide consistency across the valley. Ideally this would be the same organization that owns the recycling/trash drop site

system. It is also important that the owner of the public staff/elected official education program have some recycling industry knowledge.

➔ Single-Stream Transition – As with the other improvements explored in this document, capital costs for the CHS recycling depot will be reduced if Dumpsters are used for the collection of single-stream materials instead of trailered units. *This assessment is outside the scope of this study, however.*

➔ Funding Sources – Sources that SLVEC/CCW have already begun developing on behalf of future program owners include the USEPA grant and funding from Trinchera Blanca that CCW already has obtained and will used towards the CHS education program through 2018. An additional source may be USDA Solid Waste Management Grant funding' SLVEC/CCW have already vetted a proposal with USDA staff and expects to submit a grant application later this year.

Other considerations that are indirectly related to these programs include the investigation into efficiencies of existing agency waste management hauling services such as;

- Right-sizing of trash containers - in many cases the number of trash containers could be reduced at decreased costs during normal operations (e.g., the La Jara Elementary School may have a larger Dumpster service than is justified by the student population)
- Utilize the same hauler for recyclables and trash collection – hauler consistency can reduce service costs (e.g., the CHS and the La Jara Elementary Schools currently utilize two different haulers)

SECTION 5.0
RECOMMENDATIONS

5.1 RECOMMENDED PROGRAMS

While each of the improvement options discussed in previous sections have the potential to increase waste diversion directly or indirectly, some of the components have clearer advantages than others. Tables 5-1 and 5-2 (next page) considers benefits and recommends those programs that will best meet the stakeholder goals.

Table 5-1
Recommended Program Components

	PROGRAM	STRENGTHS	WEAKNESS	RECOMMENDATION
REGIONAL RECYCLING DROP SITES	Initial Drop Site Development (3 sites) Subsequent Site Development (up to 10 sites)	• Provides much-needed access to rural communities • Flexible & low-tech operations • May divert up to 900 tons/year	• High capital & operating costs (until singe-stream Dumpsters can be used)	• Delay development until after education programs are in place & any changes to RRC are made
RRC ENHANCE-MENTS	New Baling System	• Critical to drop site system • Feasibility proven by existing baler	• High capital costs	• Pursue in tandem with initial drop site system investment
	New Bale Storage Building	• Relatively small investment • Will improve bale quality	• Cost/benefit over current operations isn't clear • Costs to obtain building permit & installation unknown	• Do not purse until greater benefits can be verified
	New Staffing	• Critical to drop site system (cannot expect Alamosa to cover non-city costs)	• Adds cost to drop site system	• Establish payment as RRC tip fee (included in drop site user fees/pre-paid trash bags)
EDUCATION	CHS Recycling Depot & Student Program	• May divert up to 740 tpy (district) • Support community culture shift	• Challenge adding programs without high school labor costs	• Prioritize as early in the planning period as possible
	Public Staff & Elected Official Program	• Obtain active support for programs	• Challenge rolling out during grant cycle	• Prioritize as early in the planning period as possible

Table 5-2
Recommendations for Other Programs

		Strengths	*Weakness*	*Recommendation*
Other Programs Not Evaluated	**Program Ownership (all)**	• Critical to consistent outcomes • Potential to maximize economies / minimize costs	• No organization currently suited to own • Funding will be an on-going challenge • May differ between programs	• Single, over-arching owner recommended for all programs • IGA or JPA preferred (alternatively, the SLVEC with long-term board commitment)
	Regional Waste Diversion Promotion	• Instant brand recognition • Consistent messaging & less public confusion • Universal waste diversion goals & results	• Often dismissed as too "soft" to spend resources on • Will require regional deployment & regular updates	• Develop early in the process (include costs as part of initial RREO Tier II grant) • Develop jointly with ASU & other stakeholders

5.2 Environmental Benefit Summary

Taken together as a multi-program strategy, the program recommendations in Table 5-1 have the potential to accomplish the benefits described in the sidebar below.

Key Outcomes:

! *Increase recycling of traditional paper and container materials by at least 1,600 tons/year – this would bolster the 1,500 tons diverted valley-wide in 2016 by more than two times and would bring the overall waste diversion rate in the valley to about 22% even if no other programming is added (organics recovery and single-stream services could significantly increase this rate)*

! *Reduce greenhouse gases by nearly 7,000 metric tons of carbon dioxide equivalents - this is equals the reducing the emissions from miles driven by residents and tourists in SLV by over 16 million miles every year*

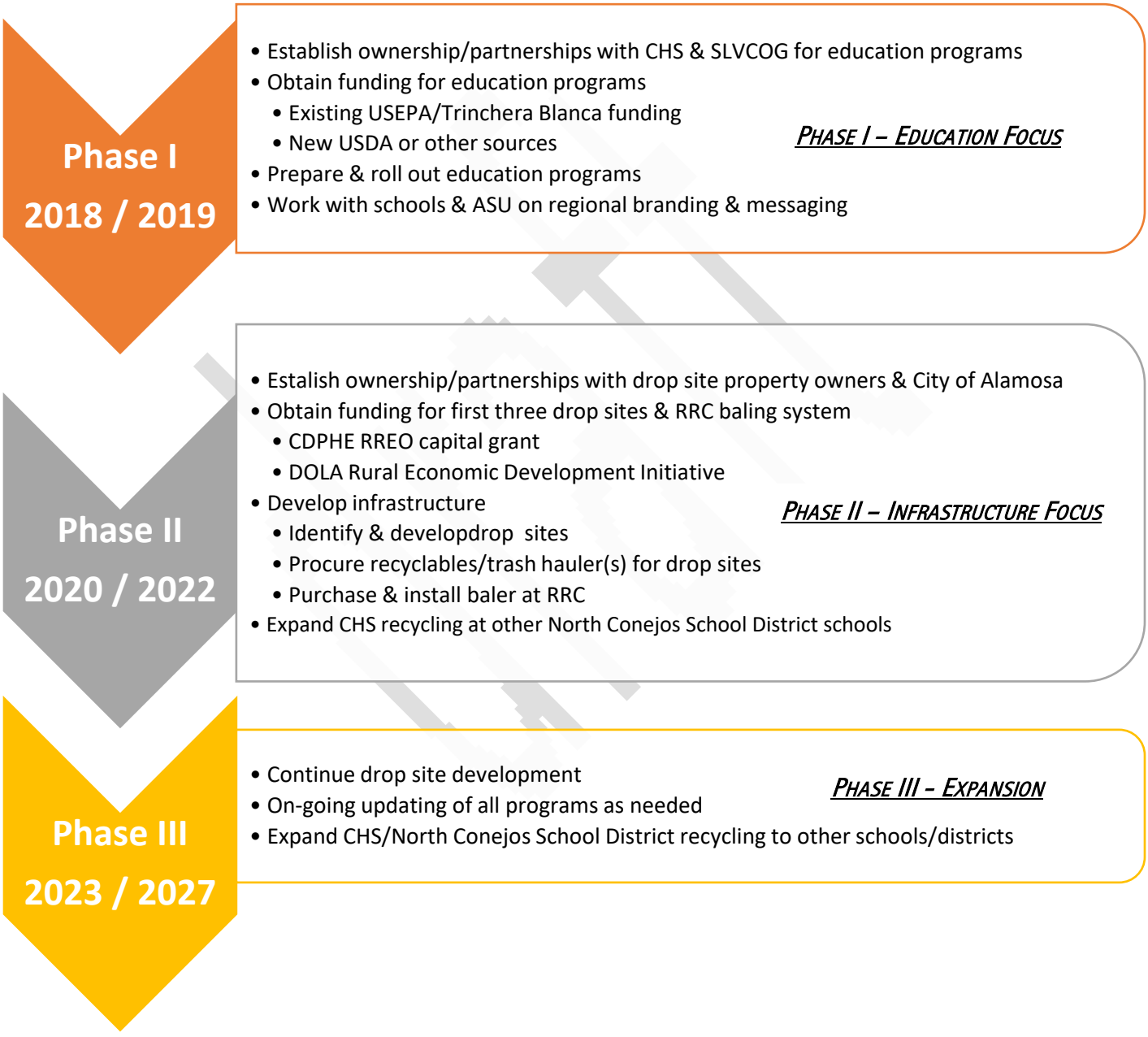
5.3 Suggested Implementation Strategy

Figure 5-1 (next page) identifies and recommends a phased-in approach for implementing the recommended program components over the 10-year planning period. They include:

- An early focus in Phase I on education and planning
- Drop site development in Phase II after the education programs are in place, any changes to the RRC recycling hub are made (if any) and any MDS collection points in Rio Grande County (if any) are established

- Continued growth in Phase III that allows future drop site design and operation modifications in response to public need, evolving recycling and trash stream composition and other solid waste system changes that may occur

Figure 5-1
Implementation of Waste Diversion Improvements



5.4 OTHER CONSIDERATIONS

Valley-Wide Waste Diversion Brand and Messaging – The key components of a successful promotional program are:

- Strong support from local officials who understand the value of waste diversion, are familiar with the waste management idiosyncrasies in the valley, have credibility on the issues and actively encourage programs
- Simple branding – with a simple but colorful, easily recognizable logo and label that is used on all waste diversion promotions throughout the valley
- Consistent messaging – that transmits the same message repeatedly on what to recycle, how to recycle and where to recycle
- Effective promotion throughout communities and to visitors

ASU and the Task Force members are ideal resources for designing, replicating and distributing an effective logo and label that all private, public, non-profit and citizen stakeholders can use.

Other Waste Diversion Material Targets – These include:

- Organics (MSW organics recovery was not prioritized in this study due to the lack of existing infrastructure, transportation needs and high costs) - food and yard wastes constituted the largest portion of materials measured during the May 2017 waste audit[xxxviii] and should be considered towards the end of the planning period
- Special wastes – most drop sites will have space for some additional diversion activities, such as short-term storage of special wastes and would allow for problem materials that are prevalent in illegal dumps to be addressed on a periodic basis (e.g., electronic waste, tires, appliances and furniture)

Overall Funding – Phase I/Education funding needs are expected to be nearly $50,000 for capital and $6,000 to $8,000 for annual operations. Phase II/Infrastructure capital needs are estimated at over $400,000 with operational costs ranging from $80,000 to $95,000 per drop site (these costs are expected to be off-set by user fees of taxes). Phase III/Expansion capital costs could be as high as $600,000 for remaining drop sites, with operating costs more than twice those for Phase II.

These resource requirements will require a comprehensive funding strategy that includes a mix of education/training, infrastructure and operating fund sources. Sections 2 through 4 have described the multiple efforts already completed or underway by SLVEC/CCW – these efforts will likely need to be re-doubled as Phase II approaches. Additional funding these organizations are pursuing to assist with the ability of future program owners to formalize and successfully implement these programs includes the Colorado Health Foundation, Iselin Foundation and USDA Solid Waste Management Grants specifically to support grant and project development.

Other Resources – The Colorado Association for Recycling (CAFR) is a resource that has largely been untapped by SLVEC, CCW and most study stakeholders to date. CAFR is available to assist owners and

stakeholders in writing grant, program development and diversion education. The organization will be evaluating new regional chapters to provide more localized support. If there is strong need and passionate champions in the valley, SLV could be a candidate for a new chapter.

Lack of Data – The lack of detailed quantity and cost data has limited the definitiveness of analyses in the study. The criticality of using all findings judiciously cannot be overstated. All assumptions and estimates must be reviewed and verified before programming is undertaken, infrastructure designed or equipment purchased.

[i] Includes CDPHE funding from the Recycling Resources Economic Opportunity (1-year funding, 2017) and USEPA Environmental Justice Collaborative Problem Solving (2-year funding, 2016-2018) programs.
[ii] MSW includes solid waste generated by residents, businesses and institutions. It does not include agricultural, industrial or construction/demolition debris (although in some parts of Colorado MSW and non-MSW may be mixed together).
[iii] Based on Colorado State Demography projections (November 2016) and "San Luis Valley Baseline Municipal Solid Waste Findings" technical memorandum by LBA Associates (April 2017).
[iv] See the "San Luis Valley Baseline Municipal Solid Waste Findings" technical memorandum by LBA Associates (April 2017) for more information.
[v] Colorado Department of Public Health & Environment, 2016 waste diversion rate and recycling totals.
[vi] See the "San Luis Valley Municipal Solid Waste Trash Audit Results" technical memorandum by LBA Associates (May 2017) for more information.
[vii] Since the SLV gap analysis was conducted, the State of Colorado's Solid and Hazardous Waste Commission has adopted state-wide diversion goals of 35% by 2026 and 13% for non-Front Range areas.
[viii] Lake County has three recycling/trash sites (with pre-paid bags) and Grand County has two. In Grand County - the Grand Lake site is a trash only site (with variable rates based on pre-paid bags); the Waste Connections site is both recycling & trash with pre-paid bags for both materials; the GRRC site is recycling only with donations as the only revenue stream; and the Town of Fraser is currently building a recycling/trash drop site using RREO funds.
[ix] Mineral County also operates a MSW landfill. The need for – or interest in – a recyclables/trash collection site on this side of the valley is unknown, however.
[x] This per-ton calculation is based loosely on both recyclable and trash tons and would vary if the unit cost of just one stream was considered.
[xi] Pat Steenburg email, September 26, 2017.
[xii] As a comparison, recyclable tip fees (privately-owned transfer station) in Grand County were $113/ton in 2016, although the haul distance between the drop site and transfer station is very short.
[xiii] Based on a range of 175 to 250 households using the drop site for recycling once/month and paying a $2 donation 50% of the time.
[xiv] Variable rate systems (often called pay-as-you-throw or PAYT) tie pricing to trash quantity. They establish larger fees for those who have more trash and create an incentive for reducing trash quantities through reuse, reduction and recycling. These systems can be applied to curbside or drop site programs, and can be used with rigid collections containers or bags.
[xv] Regarding the pre-paid trash sidebar:

- Bag usage is based on 2.45 persons/household and 2 bags/household-week
- Based on the plasticplace.com cost for 30-gallon bags (at least 24 cases, 100 bags/case), the purchase price would be about $24/case or $0.24/bag
- The City of Alamosa has estimated a per household fee of $10-$12/month for curbside single-stream service – this would be in addition to trash service fees of $11-$14/month (paid as part of utility bills in 2018)

[xvi] Procurement of hauler services will ideally encourage competitive bids, culminate in an effective partnership and yield a contract that is flexible enough to adapt to changing conditions, includes the provision of trash Dumpsters and requires at least annual reporting of all tons hauled (by material and drop site).

[xvii] Powering of compaction units could be limited to staff operation (i.e., periodically throughout the week). Trailered compaction units are available that can also be hauled by a pickup and can cost upwards of $40,000 (per ProTainer for a 15-cubic yard unit with a trailer mounted gas engine, September 2017).
[xviii] Pat Steenburg phone conversation, September 26, 2017.
[xix] Pat Steenburg and Stacy Peters (multiple conversations, August and September 2017).
[xx] Based on the quantity impacts in Table 2-1 and 0.50 FTE required to bale 395 tons/year currently.
[xxi] Based on 1,200 pounds/bale, average use sites (48 tpy of cardboard) and an estimated 52 drop sites/year equivalent (i.e., assumed one site first two years, three sites second two years, six sites next four years and ten sites final two years).
[xxii] Based on Appendix C cardboard tons and an estimated 1,200 pounds/bale (Excel quote).
[xxiii] The Revolution Systems manufacturers a small-scale processing system (operational at Milner Landfill in Milner and Goodwill in Denver) – see www.ultimatespecialtiesllc.com/machinery.htm.
[xxiv] Superintendent Curt Wilson phone conversation, September 7, 2017.
[xxv] This analysis does not include the North Conejos Alternative Program due it's largely on-line operations.
[xxvi] Assumptions and basis include:

- Generation rate of 1 pound/student-day - per www2.calrecycle.ca.gov/wastecharacerization/generation/rates
- 180 equivalent school days/year and 36 weeks/year (regardless of number 4- or 5-day weeks)
- Waste composition based loosely on *www2.calrecycle.ca.gov/reducewaste/schools/composition.htm;* Chittenden County, Vermont 2003; and Lake County, CO 2015/2016 waste composition audits
  - Recycling potential assume to be approximately 30% of total waste with a density of 100 pounds/cubic yard for commingled materials
  - Food waste potential assumed to be approximately 45% of total waste with a density of 500 pounds/cubic yard
  - Trash density assumed to be 275 pounds/cubic yard

[xxvii] EcoCycle's program posters http://www.ecocycle.org/schools/overview and Pitkin County's award-winning "Talkin Trash" campaigns are excellent examples.
[xxviii] Implemented by the Lake County Intermediate School which won the Presidential Youth Award in 2016.
[xxix] It is highly recommended that any hauler contract requires haulers to report quantities hauled to RRC or SLVRSWA monthly. Weight data is preferred, but students can convert volume to weight if needed.
[xxx] The Colorado Department of Education's Colorado Academic Standards for Science addresses the inclusion of resource conservation materials in Grade 4 Life Science and Grade 6 Earth Science classes, and underscores the growing acknowledgement of the importance of this topic in our local schools.
[xxxi] Implemented by EcoCycle in the St. Vrain and Boulder Valley School Districts.
[xxxii] Other schools have developed protocol for waste audits that can be used at CHS – examples include Lake County and Boulder County programs. The SLVEC/CCW also has a sort protocol developed by LBA Associates that could be adapted for this work.
[xxxiii] See CalRecycle "The Worm Guide – A Vermicomposting Guide for Teachers" (2004).
[xxxiv] Located in Poncha Springs - contact is Mickey Barry at 719.207.1197.
[xxxv] This commercial facility is located at 8925 Rancho Colorado Boulevard, Fountain and is owned and operated by Waste Management. Tours can be scheduled through Ron Gabor at 719.382.8383 or rgabol@wm.com (although there was no response to a query about potential tours for this study).
[xxxvi] This public facility is located at 1901 63rd St, Boulder and includes a drop site, single-stream processing and hazardous materials management facility with a viewing walkway and observation tower that allows safe exposure to recyclables processing as well as a hallway of educational displays and numerous environmental sustainability. Group tours are conducted Tuesdays, Wednesdays and Thursdays. Tours can be scheduled at 720.564.226 or resourceconservations@bouldercounty.org.

[xxxvii] St. Vrain and Boulder Valley School Districts - http://www.ecocycle.org/schools/overview.
[xxxviii] The RRC and other programs currently stockpile considerable volumes of yard waste until diversion, burn or other options are available. While a mobile is available from the City of Alamosa, the ability to produce useable product is limited.

APPENDIX A
UNIVERSE OF WASTE IMPROVEMENT OPTIONS

Appendix A

UNIVERSE OF WASTE IMPROVEMENT OPTIONS

CURRENT SHORT-FALLS & BARRIERS 2017	IMPROVEMENTS NEEDED FOR 2027
Very large, geographically isolated region	Provide access to recycling locally in each county & major communities
No regional leadership for waste diversion	Expand SLVRSWA, SLVEC, CCW, other - or develop new organization
Reliance on burning in some counties	Educate communities about negative impacts - find diversion alternatives
Significant illegal dumping issues	Consider drop-site and/or collection events for problem items (especially ewaste)
Limited access to recycling	Consider replicable drop sites operated locally but managed regionally
Limited regular curbside collection	Consider single-stream in specific communities only (needs to be hauled out of region)
Only three recycling drop sites - haul distance is excessive for many	Expand existing & add new drop sites - potentially include trash & special waste collection
Current MSW diversion rate 18%	No goals set although need to increase this value was acknowledged
Current MSW stream = 33% traditional recyclables	
Different recyclables collected in most programs (confusion)	Standardize material accepted throughout region
Limited recyclables process in region	
No single-stream processing	Single-stream MRF not feasible due to low quantities
Limited baling & storage of source-separated (Alamosa)	Evaluate expansion/improvements to Rickey Center as transfer station for additional regional recyclables
Limited markets in region (end-use jobs are not local)	Research opportunities for glass and textiles end-users
Source-separated glass accepted only in Alamosa & used for Public Works projects	
High textiles including items not accepted by thrift stores	
No regular organics recovery	Evaluate potential demand for processed limbs, branches & wood - including right-sized chipper/grinder
Notable yard/wood waste stockpiled for burning	
Insufficient demand for chipped/mulched wood	
Current MSW stream = 32% divertible organics	
Limited collection of e-waste, appliances, bulky items, textiles	Consider regular system of collection events that move throughout region
Existing reuse facilities not fully leveraged	Develop support for Habitat for Humanity/ReStore and Rainbow End Thrift
Leading recyclers not fully leveraged	Partner with City Market & Safeway for outreach and sponsorship
	Support existing reuse/recyclable business/organizations (don't compete)
Limited school programs with waste diversion component	Develop education program with specific school component
	Consider organics recovery pilot projects
Education & public outreach information is spotty	Consider multi-component program that targets multiple audiences and includes both start-up as well as on-going messaging and materials that can be used by stakeholders regionally
Lack of awareness around impacts of landfilling & burning	
Lack of awareness around existing diversion opportunities	
Need for cultural shift to include waste diversion	
Education needed for multiple groups (residents, businesses, visitors, students, staff & elected officials)	

2017 short-falls based on extensive SLVEC/CCW baseline survey, MSW audit and existing system knowledge - 2027 needs based on public process and Task Force review

Shaded 2027 actions indicate needs being considered by SLVEC/CCW as waste diversion improvements for future analysis

APPENDIX B
POTENTIAL RECYCLING/TRASH DROP SITE LOCATIONS

Potential Locations	*Considerations*
2017 through 2022	
Antonito	Public hauler provides curbside trash to most residents
Blanca	Proximal to existing trash transfer station
Center	Mandatory curbside trash collection for residents, multi-family and commercial waste generators
Monte Vista	
San Luis	Proximal to existing trash transfer station
SLVRSWA Landfill	Currently accepts self-haul trash
2023 through 2027	
La Jara	Existing Centauri High School recycling program with potential recycling depot expansion
Moffat	
Saguache	Location of Saguache County Landfill (currently accepts self-haul trash)
South Fork	
Others As Needed	

! *These sites are suggested for preliminary planning purposes only – no discussions with local government, haulers, landfill managers or other stakeholders have been conducted related to facility siting, operation or other*

! *MDS Waste & Recycling is evaluating privately-owned and operated single-stream recycling drop sites in some of these locations. If the company is successfully in bringing these sites on line, the potential consideration for inclusion in the regional recycling drop site system evaluated in this study should be re-evaluated*

APPENDIX C
ESTIMATE OF RECYCLABLE and TRASH DROP SITE QUANTITIES

Appendix C

ESTIMATE OF CONCEPTUAL RURAL DROP SITES - RECYCLABLE QUANTITIES[a]

MODEL SIZE	SERVICE AREA POPULATION			BASED IN ESTIMATED PER-CAPITA USAGE												
				TONS RECYCLABLES GENERATED PER CAPITA[b]												
				Min Gen	Avg Gen	Max Gen										
	Min	Max	Average	100 #/cap-yr	125 #/cap-yr	150 #/cap-yr										
Low	300	2,000	1,150	57.5												
High	1,500	4,500	3,000			225										
Average			2,075		130											
				CARDBOARD/KRAFT + CHIPBOARD				PLASTICS #1 PET				PLASTICS #2 NATURAL MILK JUGS/WATER BOTTLES (40%)				
				Annual Tons	*Annual Cubic Yards*	*Weekly Cubic Yards[c]*		*Annual Tons*	*Annual Cubic Yards*	*Weekly Cubic Yards[c]*		*Annual Tons*	*Annual Cubic Yards*	*Weekly Cubic Yards[c]*		
Low Usage	Min/Avg population & Avg generation			21	766	14.7		7	429	8.3		1	86	1.7		
Avg Usage	Avg population & Avg generation			48	1,728	33.2		15	968	18.6		3	194	3.7		
High Usage	Max/Avg population & Avg generation			84	2,998	57.7		27	1,679	32.3		5	336	6.5		
				ALUMINUM CANS, FOIL & PLATES				STEEL CANS				PLASTICS #2 NATURAL DETERGENT, ETC. (60%)				
				Annual Tons	*Annual Cubic Yards*	*Weekly Cubic Yards[c]*		*Annual Tons*	*Annual Cubic Yards*	*Weekly Cubic Yards[c]*		*Annual Tons*	*Annual Cubic Yards*	*Weekly Cubic Yards[c]*		
Low Usage	Min/Avg population & Avg generation			3	112	2.2		4	76	1.5		2	129	2.5		
Avg Usage	Avg population & Avg generation			6	252	4.9		10	171	3.3		5	290	5.6		
High Usage	Max/Avg population & Avg generation			10	438	8.4		17	297	5.7		8	504	9.7		

SUMMARY TOTALS	
Low Total Tons	39
Low Total CY	1,598
CY/Week	30.7
Avg Total Tons	87
Avg Total CY	3,604
CY/Week	69.3
High Total Tons	151
High Total CY	6,252
CY/Week	120.2

		Audit Projection	% of total	Density #/cy		
Based on 2017 waste audit results	OCC/Kraft	1,700	25.37%	75	lb/cy	Projections based on 2017 waste audit - densities based on USEPA Volume-to-Weight Conversion Factors, April 2016 unless otherwise noted)
	Office Paper	200	2.99%	130	lb/cy	
	ONP	300	4.48%	580	lb/cy	
	Chipboard	800	11.94%	22	lb/cy	Tellus (in Cal Recycle Diversion Study Guide, App I)
	OMG	700	10.45%	950	lb/cy	RecycleMania/USEPA 1997
	Glass	1,000	14.93%	380	lb/cy	
	Plastic #1	800	11.94%	32	lb/cy	*Combined OCC plus chipboard density calculated to be (#/cy) =*
	Plastic #2	400	5.97%	32	lb/cy	56
	Aum UBCs	300	4.48%	46	lb/cy	
	Steel Cans	500	7.46%	113	lb/cy	*Assume 40% natural HDPE & 60% colored HDPE per Chaz Miller/Waste360*
		6,700	100.00%			

[a] ***Estimates are based on approximate data and multiple assumptions for conceptual program - all values should be used judiciously & verified before design or operating programs. Values rounded to whole numbers (excepting weekly volumes).***

[b] Granby/Grand Lake (single-stream, 1 day/week) = 141#/cap-yr; Aspen (single-stream, 24/7) = 340#/cap-year; Alamosa (source-separated) = 100#/cap-year (Alamosa has no trash collection)

[c] Based on 52 weeks/year, 100% fill rate

Appendix C

ESTIMATE OF CONCEPTUAL RURAL DROP SITES - TRASH QUANTITIES[a]

MODEL SIZE	SERVICE AREA POPULATION			ANNUAL TONS TRASH BASED ON WASTE GENERATION RATE[b]		
				Min Pop	Avg Pop	Max Pop
	Min	Max	Average[f]	*3 ppcd*	*3.5 ppcd*	*4 ppcd*
Low	75	800	438	240		
High	600	1,000	800			584
Average			619		395	

		ANNUAL CUBIC YARDS TRASH BASED ON WASTE GENERATION RATE[c]		
Low	Min/Avg population & Avg generation	1,742		
Average	Avg population & Avg generation			4,247
High	Max/Avg population & Avg generation		2,874	

		DUMPSTER-EQUIVALENTS PER WEEK[d]		
Low	Min/Avg population & Avg generation	5.6		
Average	Avg population & Avg generation			13.6
High	Max/Avg population & Avg generation		9.2	

		ROLL-OFF EQUIVALENTS PER WEEK[e]		
Low	Min/Avg population & Avg generation	1.1		
Average	Avg population & Avg generation			3
High	Max/Avg population & Avg generation		1.8	

[a] ***Estimates are based on approximate data and multiple assumptions for conceptual program - all values should be used judiciously & verified before design or operating programs. Values rounded to whole numbers (excepting container quantities)***

[b] Based on findings in baseline survey = 3.8 #/capita-day (MSW trash with tires - excludes diverted materials)

[c] Based on assumed 275 #/cy density (loose mixed residential/commercial waste - per USEPA Volume-to-Weight Conversion Factors, April 2016)

[d] Based on 52 weeks/year, 6-cy Dumpsters, 100% fill rate

[e] Based on 52 weeks/year, 30-cy Dumpsters, 100% fill rate (no compaction)

APPENDIX D
RECYCLING/TRASH DROP SITE COST ESIMATES

	SLVEC/CCW - RREO GRANT - WASTE DIVERSION STUDY
Improvement:	**Public Recycling & Trash Drop Site**
Date:	September-17
Cost Estimate Basis:	2017$ - Cost assumptions from vendors & project data
Location:	San Luis Valley, Colorado

CAPITAL COSTS PER DROP SITE

Item	Quantity	Units	Unit Cost	Total
Land Purchase (1)	0.15	Acres	$0	$0
Final Grading (2)	1	LS	$3,600	$3,600
Crushed Rock/Gravel (3)	1	LS	incl in grading line item	
Site Lighting	0	EA	$0	$0
Drop-Site Signage (4)	1	EA	$2,600	$2,600
Security Fencing (5)	1	LS	$8,300	$8,300
Surveillance System (6)	1	LS	$2,300	$2,300
Subtotal Site Improvements				$16,800
Contingency (30%)				$5,000
SITE IMPROVEMENT COSTS PER SITE - ALL USAGE				$21,800
Mobile Equipment - Containers (Low Usage):				
Recycling Containers (7)	2	EA	$17,000	$34,000
Trash Dumpsters (8)	0	EA	$1,100	$0
Mobile Equipment Improvements				$34,000
Contingency (30%)				$10,200
				$44,200
TOTAL CAPITAL COST PER DROP SITE - LOW USAGE				**$66,000**
Mobile Equipment - Containers (Average Usage):				
Recycling Containers (7)	4	EA	$17,000	$68,000
Trash Dumpsters (8)	0	EA	$1,100	$0
Mobile Equipment Improvements				$68,000
Contingency (30%)				$20,400
				$88,400
TOTAL CAPITAL COST PER DROP SITE - AVERAGE USAGE				**$110,200**

Assumptions:

1 Land assumed to be existing city/county property or donated use, requiring minimal grading for drainage. See INPUTS sheet for area requirements.

2 Minimal grading required by small dozer (including mobilization/demobilization).

3 Aggregate base course hauled, placed at 4" depth and compacted on finally graded surface (including mob/demob) approximately 160 tons - based on quotes from Absmeier Landscaping (Alamosa, CO - Sept 2017).

4 12" by 12" aluminum signage for each recycling bin & trash Dumpster plus three 36" b 48" aluminum sign for site entrance, recycling & trash areas (Fast Signs - Aug 2016).

5 Perimeter 6-ft chain-link fence and two metal locking gates - from Garrison Fence, Alamosa - Sept 2017).

6 Wireless, battery-operated security cameras (8) w adjustable mounts (130-degrees, 25' night distance), solar panels, cloud storage, assume installation on existing light poles or affixed above dumpsters around site (Netgear on-line pricing - Sept 2017).

7 Metal 10-cubic yard (CY) trailered roll-offs with 4-CY OCC compartment plus 6 1-CY poly bins - includes ball hitch, 1 spare tire/rim & 1 bin dolly (based on quotes from Pro-Tainer & Alley Cat - Sept 2017). Does not include redundant unit (should be considered with 2 or more sites).

8 Metal 6-CY dumpsters with metal locking lids (trash units) - hauler amortization included in hauler costs (see Drop Site Hauling Cost Estimate).

	SLVEC/CCW - RREO GRANT - WASTE DIVERSION STUDY
Improvement:	**Public Recycling & Trash Drop Site**
Date:	September-17
Cost Estimate Basis:	2017$ - Cost assumptions from vendors & project data
Location:	San Luis Valley, Colorado

ANNUAL OPERATING COSTS PER DROP SITE - LOW USAGE

LABOR

Job Classification (1)	Qty	Labor Rate	Hrs/Yr		Total
Manager	1	$35	48	$	1,700
Recycling/Maintenance Staff	1	$35	832	$	29,100
			Subtotal	$	30,800

Notes:

Manager oversight = RRC coordination, sponsors, managing misuse issues — 4 hrs/month
Recycling/maintenance staff for on-site recycling/travel, site maintenance/clean/snow/surveillance = — 16 hrs/week

SITE MAINTENANCE & UTILITIES

Item		Quantity	Unit Price		Total
Site Maintenance (2)	2%	$21,800		$	400
Container Maintenance (3)	3%	$44,200			$1,300
			Subtotal	$	1,700

CONTINGENCY (20%) $6,500

BASE ANNUAL TOTAL O&M PER DROP SITE $ 39,000

TRASH BAG PURCHASE (Low Usage)

Item	Quantity	Unit Price		Total
40-gal plastic bags (4)	20,000 bags	$0.24	$	4,800
Contingency (20%)			$	1,000
		Subtotal	$	5,800

TOTAL ANNUAL O&M PER DROP SITE - LOW USAGE $ 44,800

1100

ANNUAL OPERATING COSTS PER DROP SITE - AVERAGE USAGE

LABOR

Job Classification (1)	Qty	Labor Rate	Hrs/Yr		Total
Manager	1	$35	48	$	1,700
Recycling/Maintenance Staff	1	$35	832	$	29,100
			Subtotal	$	30,800

Notes:

Manager oversight = RRC coordination, sponsors, managing misuse issues — 4 hrs/month
Recycling/maintenance staff for on-site recycling/travel, site maintenance/clean/snow/surveillance = — 16 hrs/week

SITE MAINTENANCE & UTILITIES

Item		Quantity	Unit Price		Total
Site Maintenance (2)	2%	$21,800		$	400
Container Maintenance (3)	3%	$88,400			$2,700
			Subtotal	$	3,100

CONTINGENCY (20%) $6,800

BASE ANNUAL TOTAL O&M PER DROP SITE $ 40,700

TRASH BAG PURCHASE (Average Usage)

Item	Quantity	Unit Price		Total
40-gal plastic bags (4)	32,900 bags	$0.24	$	7,900
Contingency (20%)			$	1,600
		Subtotal	$	9,500

TOTAL ANNUAL O&M PER DROP SITE - AVERAGE USAGE $ 50,200

Assumptions:

1 Labor rates provided by SLVEC - includes all benefits.
2 Expressed as percentage of capital site improvement costs.
3 Expressed as percentage of capital mobile equipment costs.
4 Recommend minimum 2-mil thickness either clear or bright color to distinguish from non-pre paid bags (based on estimated household use - see Appendix A & www.plasticplace.com on-line quote, September 2017).

	SLVEC/CCW - RREO GRANT - WASTE DIVERSION STUDY
Improvement:	**Public Recycling & Trash Drop Site**
Date:	September-17
Cost Estimate Basis:	2017$ - Cost assumptions from vendors & project data
Location:	San Luis Valley, Colorado

HAULING COSTS PER DROP SITE - LOW USAGE (1)

Drop-Site Collection	**Trash**	**Recyclables**	***Comments***
Tonnages (tpy): Low	240	39	*See Appendix B*
Yards (CY/week): Low	34	31	*See Appendix B*
No of Pulls/Week	1	2	*See Appendix B*
No of Dumpsters/Trailers	7	2	*See Appendix B plus 20% fill factor*
Hook-Up & Unload Time/Pull (minutes):	35	60	*5 minutes per unit, 15 minutes per recycling container*
One-Way Distance (miles)	35	35	
Average Speed (mph):	50	50	
Average Trips/Year:	52	104	
Hours Per Trip	1.3	2.4	*Only one way for trash*
Weekly Freight Hours:	1.3	4.8	
Wkly Prorated Veh Inspect/Breaks:	0.2	0.9	*Ratio wkly freight hrs to Total wkly inspect'ns/breaks*
Annual Freight Hours:	66.7	249.6	*Freight hours only for vehicle fuel, oil & grease cost*
Total Miles/Yr:	3,640	7,280	
Truck Fuel, Oil & Grease			
Fuel Cost per Gallon	$2.85	$2.85	*Diesel prices, Sept 2017 US Energy Info Admin*
Miles per Gallon	4	15	*Estimate based on collection vehicles*
Oil & Grease ($/freight hour)	$0.50	$0.50	
Truck Tires			
New Tires Price	$850	$250	*2012 prices escalated*
# New Tires Per 50,000 Miles	2	8	*Nissan tire price per michelinman.com*
Retread Tires	$340	$0	
# Retread Tires Per 25,000 Miles	8	-	
Truck Maintenance & Repairs			
Mechanic Labor annual salary	$65,000	$65,000	*Based on assumed $31/hour including all benefits*
Mechanic Labor % per Truck	10%	5%	*(assumed based on Alamosa driver salaries)*
Parts, Repairs, Overhaul ($/mile)	$0.50	$0.30	*$1,100.00*
Truck Driver Labor			
Driver % (based on freight time)	4%	15%	
Driver annual salary	$54,000	$54,000	*Based on assumed $26/hour including all benefits*
Fringe benefits (% of salary)	0%	0%	*(current City of Alamosa driver salaries)*
Front-End Load Truck Depreciation			
Capital Cost	$300,000	$48,300	*Based on 2017 Alamosa purchase & 2016 Durango purchase*
Resale Value (% of truck $)	20%	20%	*(automated side and front load collection trucks)*
Replacement Miles	200,000	200,000	*3/4-ton Nissan Titan single-cab (new 2017 MSRP)*
Replacement Schedule (years)	5	5	
Annual Interest Rate	4%	4%	
Capital Recovery Factor (A/P,i,n)	0.2246	0.2246	
Dumpster Depreciation (3)			
Capital Cost per Dumpsters	$1,100	$0	*Recycling containers included in Drop Site Capital Cost Estimate*
Total Capital	$7,700	$0	
Replacement Schedule (years)	10	10	
Annual Interest Rate	4%	4%	
Capital Recovery Factor (A/P,i,n)	0.1233	0.1233	
Vehicle Insurance @ 2.5% Capital Cost	$7,500	$1,200	*Estimate % of capital cost*
Pro-Rated % of Time	4%	15%	
Tip Fees			
SLVRSWA Landfill	$18	$0	
Rickey Recycling Center (3)	$0	$50	*Tip fee includes baling and haul to end markets*
Hauler Profit/Contingency	10%	10%	

Annual Drop-Site Haul Costs:	**Trash**	**Recyclables**	**Comments**
Fuel, Oil & Grease	$2,630	$1,510	Mileage & Time Based
Tires	$520	$290	Mileage Based
Maintenance & Repairs	$2,080	$2,670	Mileage & Time Based Pro-Rated
Driver Labor	$2,160	$8,100	Time Based
Truck Depreciation	$2,160	$1,300	Pro-Rated
Dumpster Depreciation	$950	$0	Capital Cost in CAPITAL sheets
Dumpster Maintenance	$231	$0	3% of Capital Cost
Insurance	$300	$180	Pro-Rated
Tip Fees	$4,224	$1,950	
Hauler Profit	$1,526	$1,600	
Drop-Site Haul Cost Incl Tip Fees	**$16,781**	**$17,600**	
Avg Haul Cost per Trip	**$323**	**$169**	
Avg Haul Cost per Ton	**$70**	**$451**	

ASSUMPTIONS:

1 Low usage based on minimum population & low generation rate.
2 Cost balance between number of containers and pulls frequency - more Dumpsters/less recycling bins most cost-effective.
3 Trash dumpsters are provided by hauler with annual appreciation used to determine annual costs.
4 Based on current net operations cost of about $100/ton for 450 tons/year.

	SLVEC/CCW - RREO GRANT - WASTE DIVERSION STUDY
Improvement:	**Public Recycling & Trash Drop Site**
Date:	September-17
Cost Estimate Basis:	2017$ - Cost assumptions from vendors & project data
Location:	San Luis Valley, Colorado

HAULING COSTS PER DROP SITE - AVERAGE USAGE (1)

Drop-Site Collection	**Trash**	**Recyclables**	***Comments***
Tonnages (tpy): Average	395	87	*See Appendix B*
Yards (CY/week): Average	55	70	*See Appendix B*
No of Pulls/Week	1	2	*See Appendix B*
No of Dumpsters/Trailers	12	4	*See Appendix B plus 20% fill factor*
Hook-Up & Unload Time/Pull (minutes):	60	120	*5 minutes per unit, 15 minutes per recycling container*
One-Way Distance (miles)	35	35	
Average Speed (mph):	50	50	
Average Trips/Year:	52	104	
Hours Per Trip	1.0	3.4	*Only one way for trash*
Weekly Freight Hours:	1.0	6.8	
Wkly Prorated Veh Inspect/Breaks:	0.2	1.3	*Ratio wkly freight hrs to Total wkly inspect'ns/breaks*
Annual Freight Hours:	52.0	353.6	*Freight hours only for vehicle fuel, oil & grease cost*
Total Miles/Yr:	3,640	7,280	
Truck Fuel, Oil & Grease			
Fuel Cost per Gallon	$2.85	$2.85	*Diesel prices, August 2016 US Energy Info Admin*
Miles per Gallon	4	15	*Estimate based on collection vehicles*
Oil & Grease ($/freight hour)	$0.50	$0.50	
Truck Tires			
New Tires Price	$850	$250	*2012 prices escalated*
# New Tires Per 50,000 Miles	2	8	*Nissan tire price per michelinman.com*
Retread Tires	$340	$0	
# Retread Tires Per 25,000 Miles	8	-	
Truck Maintenance & Repairs			
Mechanic Labor annual salary	$65,000	$65,000	*Based on assumed $31/hour including all benefits*
Mechanic Labor % per Truck	10%	5%	*(assumed based on Alamosa driver salaries)*
Parts, Repairs, Overhaul ($/mile)	$0.50	$0.30	*$1,100.00*
Truck Driver Labor			
Driver % (based on freight time)	3%	21%	
Driver annual salary	$54,000	$54,000	*Based on assumed $26/hour including all benefits*
Fringe benefits (% of salary)	0%	0%	*(current City of Alamosa driver salaries)*
Front-End Load Truck Depreciation			
Capital Cost	$300,000	$48,300	*Based on 2017 Alamosa purchase & 2016 Durango purchase*
Resale Value (% of truck $)	20%	20%	*(automated side and front load collection trucks)*
Replacement Miles	200,000	150,000	*3/4-ton Nissan Titan single-cab (new 2017 MSRP)*
Replacement Schedule (years)	5	5	
Annual Interest Rate	4%	4%	
Capital Recovery Factor (A/P,i,n)	0.2246	0.2246	
Dumpster Depreciation (2)			
Capital Cost per Dumpsters	$1,100	$0	*Recycling containers included in Drop Site Capital Cost Estimate*
Total Capital	$13,200	$0	
Replacement Schedule (years)	10	10	
Annual Interest Rate	4%	4%	
Capital Recovery Factor (A/P,i,n)	0.1233	0.1233	
Vehicle Insurance @ 2.5% Capital Cost	$7,500	$1,200	*Estimate % of capital cost*
Pro-Rated % of Time	3%	21%	
Tip Fees			
SLVRSWA Landfill	$18	$0	
Rickey Recycling Center (3)	$0	$50	*Tip fee includes baling and haul to end markets*
Hauler Profit	10%	10%	

Annual Drop-Site Haul Costs:	**Trash**	**Recyclables**	**Comments**
Fuel, Oil & Grease	$2,620	$1,560	Mileage & Time Based
Tires	$520	$290	Mileage Based
Maintenance & Repairs	$2,020	$2,870	Mileage & Time Based Pro-Rated
Driver Labor	$1,620	$11,340	Time Based
Truck Depreciation	$1,620	$1,820	Pro-Rated
Dumpster Depreciation	$1,630	$0	Capital Cost in CAPITAL sheets
Dumpster Maintenance	$396	$0	3% of Capital Cost
Insurance	$230	$250	Pro-Rated
Tip Fees	$7,110	$4,350	
Hauler Profit	$1,777	$2,248	
Drop-Site Haul Cost Incl Tip Fees	**$19,543**	**$24,728**	
Avg Haul Cost per Trip	**$376**	**$238**	
Avg Haul Cost per Ton	**$49**	**$284**	

ASSUMPTIONS:

1 Average usage based on average population & some seasonal use.
2 Trash dumpsters are provided by hauler with annual appreciation used to determine annual costs.
3 Based on current net operations cost of about $100/ton for 450 tons/year.

APPENDIX E
EDUCATION PROGRAM COST ESTIMATE

	SLVEC/CCW - RREO GRANT - WASTE DIVERSION STUDY
Improvement:	**Education Programs**
Date:	September-17
Cost Estimate Basis:	2017$ - Cost Assumptions, Vendor Quotes & Project Data
Location:	La Jara, Colorado

CENTAURI HIGH SCHOOL - CAPITOL COSTS PER RECYCLING DEPOT

Item	Quantity	Units	Unit Cost	Total
Site Improvements (1)				
Land Purchase	0	Acres	$0	$0
Final Grading	0	LS	$1,500	$0
Crushed Rock/Gravel	0	LS	$5,500	$0
Site Lighting	0	EA	$0	$0
Security Fencing	0	LS	$12,000	$0
Signage (2)	1	LS	$1,000	$1,000
Subtotal Site Improvements				$1,000
Contingency (30%)				$300
SITE IMPROVEMENT COSTS PER SITE - SCHOOL PROGRAM				$1,300
Mobile Equipment - Containers:				
Trailered Recycling Container (3)	1	EA	$17,000	$17,000
Dumpster for Cardboard (4)	1	EA	$1,100	$1,100
Interior Recycling Cans (5)	25	EA	$32	$800
Subtotal Mobile Equipment				$18,900
Contingency (30%)				$5,670
MOBILE EQUIPMENT COSTS PER SITE - SCHOOL PROGRAM				$24,570
TOTAL CAPITAL COSTS PER SITE - SCHOOL PROGRAM				**$25,870**

Assumptions:

1 Assumes depot will be located adjacent to existing trash Dumpster on level, well-graded ground & no additional fencing, lighting or security will be needed.

2 12" by 12" aluminum signage for each recycling bin & Dumpster - 12 total signs (Fast Signs - Aug 2016).

3 Metal 10-cubic yard (CY) trailered roll-offs with ten 1-CY poly bins - includes ball hitch, 1 spare tire/rim & 1 bin dolly (based on quotes from ProTainer & Alley Cat - Sept 2017) - does not include redundant unit

4 Metal 6-CY Dumpster with locking, plastic lids (per WasteQuip - Sept 2017)

	SLVEC/CCW - RREO GRANT - WASTE DIVERSION STUDY
Improvement:	**Education Programs**
Date:	September-17
Cost Estimate Basis:	2017$ - Cost Assumptions, Vendor Quotes & Project Data
Location:	La Jara, Colorado

CENTAURI HIGH SCHOOL - ANNUAL OPERATING COSTS

Item Description		Quantity	Unit Cost		Total
LABOR					
Job Classification	**Qty**	**Labor Rate**	**Hrs/Yr**		**Total**
SLVEC/CCW (1)					
Management	1	$35	18	$	600
Staff	1	$35	36	$	1,300
Oversight subtotal				$	1,900
School - CHS Only					
Administration/Principal (2)	1	$64	36	$	2,300
Teacher - Club (3)	1	$32	216	$	6,900
Teacher - Class (3)	1	$32	0	$	-
Custodial (4)	1	$18	288	$	5,200
School labor subtotal				$	14,400
Hauler (5)	1	LS	$1,483	$	1,500
Hauler Subtotal				$	1,500
SUBTOTAL LABOR				$	17,800
LABOR CONTINGENCY (20%)				$	3,560
		ANNUAL LABOR COSTS		$	21,360

SITE MAINTENANCE & SUPPLIES

Item		Quantity	Unit Price		Total
Site Maintenance	2%	$26		$	-
Container Maintenance	3%	$737		$	700
Posters (6)	1	LS	$500	$	500
SUBTOTAL SUPPLIES				$	1,200
SUPPLY CONTINGENCY (30%)				$	400
		ANNUAL SITE MAINTENANCE & SUPPLY COSTS		$	1,600

ANNUAL TOTAL O&M - CHS RECYCLING ONLY AT CHS	**$**	**22,960**

NORTH CONEJOS SCHOOL DISTRCIT - CHS ANNUAL OPERATING COSTS

Item Description		Quantity	Unit Cost		Total
LABOR					
Job Classification	**Qty**	**Labor Rate**	**Hrs/Yr**		**Total**
SLVEC/CCW (1)					
Management	1	$35	36	$	1,300
Staff	1	$35	54	$	1,900
Oversight subtotal				$	3,200
School - CHS Only					
Administration/Principal (2)	1	$64	54	$	3,500
Teacher - Club (3)	1	$32	216	$	6,900
Teacher - Class (3)	1	$32	0	$	-
Custodial (4)	1	$18	576	$	10,400
School labor subtotal				$	20,800
Hauler (5)	1	LS	$2,248	$	2,200
Hauler Subtotal				$	2,200
SUBTOTAL LABOR				$	26,200
LABOR CONTINGENCY (20%)				$	5,240
		ANNUAL LABOR COSTS		$	31,440

SITE MAINTENANCE & SUPPLIES

Item		Quantity	Unit Price		Total
Site Maintenance	2%	$26		$	-
Container Maintenance	3%	$737		$	700
Posters (6)	1	LS	$500	$	500
SUBTOTAL SUPPLIES				$	1,200
SUPPLY CONTINGENCY (30%)				$	400
		ANNUAL SITE MAINTENANCE & SUPPLY COSTS		$	1,600

ANNUAL TOTAL O&M - DISTRICT RECYCLING AT CHS	**$**	**33,040**

Assumptions:

1 SLVEC/CCW oversight = limited to assisting with grant administration & transfer to other schools
2 Administration = principals at each school, district superintendent (as appropriate to phase)
Administrative labor based on 4 average hours/month over 36 weeks/8.5 months of school
3 Teacher club labor = advisement, club/class coordination. guide annual campaign, review data, find sponsor
Teacher labor based on 6 hours/week over 36 weeks/8.5 months of school
4 Custodial = depot oversight, container maintenance, administer hauler contract initially
Custodial labor based 8 hours/week over 36 weeks/8.5 months of school
Assumes hauler contract negotiated separately with custodial & administrative
5 See worksheet "HAUL CHS TO RRC" - does not include hauls from other district schools to CHS or other non-CHS schools costs
6 Assumes $5/poster, 100 posters annually

	SLVEC/CCW - RREP GRANT - WASTE DIVERSION STUDY
Improvement:	**Education Programs**
Date:	September-17
Cost Estimate Basis:	2017$ - Cost assumptions from vendors & project data
Location:	San Luis Valley, Colorado

HAULING COSTS PER DROP SITE - CHS DEPOT (CHS Only & NCSD)

	Drop-Site Collection	Trash	Depot - CHS	Depot - All NCSD	*Comments*
	Tonnages (tpy):	0.00	4.05	13.16	*See Table 4-1*
	Yards (CY/week):	0.00	2.25	7.31	*See Table 4-1*
	No of Pulls/Week	0.00	0.05	0.25	
	No of Dumpsters/Trailers	0.00	2.00	2.00	
	Hook-Up & Unload Time/Pull (minutes):	-	10	10	*5 minutes per Dumpster, 15 minutes per recycling container*
	One-Way Distance (miles)	0	15	15	
	Average Speed (mph):	50	50	50	
	Average Trips/Year:	-	3	13	
	Hours Per Trip	-	0.8	0.8	*g*
	Weekly Freight Hours:	-	0.0	0.2	
	Wkly Prorated Veh Inspect/Breaks:	-	0.0	0.0	*Ratio wkly freight hrs to Total wkly inspect'ns/breaks*
	Annual Freight Hours:	-	2.0	10.0	*Freight hours only for vehicle fuel, oil & grease cost*
	Total Miles/Yr:	0	78	390	
	Truck Fuel, Oil & Grease				
	Fuel Cost per Gallon	$2.85	$2.85	$2.85	*Diesel prices, Sept 2017 US Energy Info Admin*
	Miles per Gallon	4	15	15	*Estimate based on collection vehicles*
	Oil & Grease ($/freight hour)	$0.50	$0.50	$0.50	
	Truck Tires				
	New Tires Price	$850	$250	$250	*2012 prices escalated*
	# New Tires Per 50,000 Miles	2	8	8	*Nissan tire price per michelinman.com*
	Retread Tires	$340	$0	$0	
	# Retread Tires Per 25,000 Miles	8	-	-	
	Truck Maintenance & Repairs				
	Mechanic Labor annual salary	$65,000	$65,000	$65,000	*Based on assumed $35/hour including all benefits*
	Mechanic Labor % per Truck	10%	5%	5%	
	Parts, Repairs, Overhaul ($/mile)	$0.50	$0.50	$0.50	
	Truck Driver Labor				
	Driver % (based on freight time)	0%	1%	1%	
4	Driver annual salary	$54,000	$62,400	$62,400	*Based on assumed $30/hour including all benefits*
	Fringe benefits (% of salary)	0%	0%	0%	
	Front-End Load Truck Depreciation				
	Capital Cost	$300,000	$48,300	$48,300	*Based in 2017 Alamosa purchase & 2016 Durango purchase*
	Resale Value (% of truck $)	20%	20%	20%	*(automated side & front load collection trucks)*
	Replacement Miles	200,000	150,000	150,000	*3/4-ton Nissan Titan single-cab (new 2017 MSRP)*
	Replacement Schedule (years)	5	5	5	
	Annual Interest Rate	4%	4%	4%	
	Capital Recovery Factor (A/P,i,n)	0.2246	0.2246	0.2246	
	Dumpster Depreciation				
	Capital Cost per Dumpsters	$0	$1,100	$1,100	*One cardboard Dumpster*
	Total Capital	$0	$2,200	$2,200	
	Replacement Schedule (years)	10	10	10	
	Annual Interest Rate	4%	4%	4%	
	Capital Recovery Factor (A/P,i,n)	0.1233	0.1233	0.1233	
	Vehicle Insurance @ 2.5% Capital Cost	$7,500	$1,200	$1,200	*Estimate % of capital cost*
	Pro-Rated % of Time	0%	1%	1%	
	Tip Fees				
	SLVRSWA Landfill	$18	$0	$0	
	Rickey Recycling Center (1)	$0	$50	$50	
	Hauler Profit/Contingency	10%	10%	10%	

Annual Drop-Site Haul Costs:	Trash	Depot - CHS	Depot - All NCSD	Comments
Fuel, Oil & Grease	$0	$20	$80	Mileage & Time Based
Tires	$0	$0	$20	Mileage Based
Maintenance & Repairs	$0	$70	$230	Mileage & Time Based Pro-Rated
Driver Labor	$0	$620	$620	Time Based
Truck Depreciation	$0	$90	$90	Pro-Rated
Dumpster Depreciation	$0	$270	$270	Capital Cost in CAPITAL sheets
Dumpster Maintenance	$0	$66	$66	3% of Capital Cost
Insurance	$0	$10	$10	Pro-Rated
Tip Fees	$0	$203	$658	
Hauler Profit	$0	$135	$204	
Drop-Site Haul Cost Incl Tip Fees	**$0**	**$1,483**	**$2,248**	
Avg Haul Cost per Trip	**$0**	**$571**	**$173**	
Avg Haul Cost per Ton	**$0**	**$366**	**$171**	

ASSUMPTIONS:

1 Based on current net operations cost of about $100/ton for 485 tons/year

	SLVEC/CCW - RREO GRANT - WASTE DIVERSION STUDY
Improvement:	**Education Programs**
Date:	September-17
Cost Estimate Basis:	2017$ - Cost Assumptions, Vendor Quotes & Project Data
Location:	La Jara, Colorado

PUBLIC STAFF/ELECTED OFFICIAL - TOTAL OPERATING COSTS FOR TWO YEARS

Item Description		**Quantity**	**Unit Cost**		**Total**
LABOR					
Job Classification	**Qty**	**Labor Rate**	**Hrs/Yr**		**Total**
SLVEC/CCW					
Management	1	$35	40	$	1,400
Staff (1)	1	$35	210	$	7,400
Consultant	1	$125	40	$	5,000
SUBTOTAL LABOR				$	13,800
LABOR CONTINGENCY (20%)				$	2,800
			ANNUAL LABOR COSTS	$	16,600

SITE MAINTENANCE & SUPPLIES

Item	**Quantity**	**Unit Price**		**Total**
Site Tour Van (2)	1	8	160	$	1,300
Tour Mileage (3)	1	800	$0.54	$	400
Lunch during tours (3)	1	56	12	$	700
SUBTOTAL SUPPLIES				$	2,400
SUPPLY CONTINGENCY (30%)				$	700
		ANNUAL SITE MAINTENANCE & SUPPLY COST		$	3,100

ANNUAL TOTAL O&M	**$**	**19,700**

Assumptions:

1 SLVEC/CCW = development, present & conduct all tasks (potentially with consultant assist)
Staff labor based on 80 hrs to develop materials & research case studies plus 50 hours to give 12 presentations (with travel); plus site tours at 10 hrs each to coordinate/conduct

2 Up to 8 facility tours - based on 24-hr rental van (holds 7) (Hertz, Alamosa - Sept 2017)

3 GSA vehicle reimbursement rate (Jan 2017)

4 8 tours, maximum 7 persons/tour, assumes $12/person with tax

APPENDIX F
"CHANGING HOW WE DO GARBAGE" ARTICLE

Changing How We Do Garbage

Not surprisingly, solid waste decisions facing local governments have trended through multiple phases. In past decades, cities and counties worried about having enough landfill capacity. More recently, they focused on collection systems and facilities for diverted recyclable and organic materials. While governments still have these worries, today they are spending more and more time on policy. Policies to ensure that infrastructure and programming will be economically as well as environmentally sustainable require incentives—be they sticks, carrots, or both—that provide steady flows and continually foster waste diversion practices in our communities.

There are almost as many types of policy options and permutations as there are acronyms in the waste industry. More policies are implemented by municipalities than other governments (due to limitations on statutory policing powers and the need for states to address such broader issues as diversion goals, grant programs, bottle bills and disposal bans). A sample of policies that can be applied to different stakeholders at the local level include the following:

- ***Collection/disposal bans***—for materials with mature markets (some cities who don't have control of landfill operations have successfully implemented this: e.g., Fort Collins, CO has a collection ban on both e-waste and cardboard).
- ***Commingling levels for sorting***—such as single- versus dual-stream recyclables collection or even mixed-waste streams.
- ***Hauler rules for open market systems***—such as requiring trash haulers to collect diverted materials, establishing minimal list of recyclables and organics or requiring customer education (more aggressive hauler policies can include franchising and flow-control-like requirements).
- ***Waste generator rules***—such as required recyclables and organics collection service or mandatory program participation.
- ***Construction/demolition policy***—many cities have developed green building programs that establish minimum levels of green construction and deconstruction (and can include audit and reporting requirements, refundable deposits, penalties for lack of compliance, etc.).
- ***Diversion incentives***—such as PAYT, rebates, subsidies, recycling space in new construction, award programs, etc.
- ***Policy to fund infrastructure and programs***—can include facility and/or system user fees, material use fees (like those on plastic bags), taxes, revenue sharing, or other mechanisms (one unique approach that earns $1.7 million per year for Boulder, CO, is an occupational tax on haulers).

The good news is that many policies are low-cost for governments to enforce once they are implemented (think PAYT or mandatory collection services tied to utility bills). Some policies incur new or expanded enforcement expenses, of course, but these tend to be low compared to the investments needed for facility construction or collection fleet operation.

The bad news is that policies do have an initial implementation "cost." This may be limited to staff time needed to research other city programs, educate local leaders, undertake public outreach, and conduct inter-agency coordination. However, these seemingly basic efforts are often fraught with skeptical stakeholder groups, funding obstacles, and nervous council members. As a result, they can include multiple false starts. Additionally, many governments do not have solid waste staff trained in policy development and public facilitation. As a result, their ability to skillfully and effectively start-stop-start this process can be limited.

The growing focus on policy issues surrounding solid waste management and waste diversion in general will require governments to develop better ways to change how we, well…change. Listed below are several key strategies this author has observed and participated in that both improve policy development success and reduce frustration levels for government staff and politicians.

Determine the policy goal—Even though staff and city council may have a good idea of what specific policy components they'd like to see implemented, the most important decision will probably be why this policy is needed, i.e., what the outcome should to be. A more successful, less-contentious public process will likely result from a "what"-based platform that says, "Here's what we need to achieve; how can we collectively figure out how to get there?" as opposed to one that leaves no room for true stakeholder exchange on finding, compromising, and creating the right "hows."

Research similar policy efforts by other cities— "How do others do it?" will inevitably be a question that council or savvy stakeholders will ask, so be prepared. Identify a reasonable cross-section of cities that have successfully—and unsuccessfully—attempted similar policy (ideally with similar demographics to your community). Many cities researched will likely have gone through the same process. Staff may be able to piggyback on their efforts and minimize research.

Draft policy language with flexibility—Once the general policy content has been sketched out, be mindful of the need for flexibility that allows exemption for hardship conditions and targets appropriate audiences. Examples include allowing multifamily property owners/managers to be exempted from diversion if they prove that excessive cost would be incurred, and setting applicability thresholds for C&D policies (such as valuation or size level below which projects are not subject to regulation).

Educate and prepare political leadership early and throughout the process—The importance of this step cannot be over-emphasized. To the extent possible, allocate plenty of time to work with city council members before policy development becomes a public debate. This leadership step should focus on the following:

- ***Fully educating the council*** on all facts supporting and opposing the policy, implementation details from other

communities, estimated impacts (e.g., potential tons diverted, city capital/operating costs as well as user costs, job creation, greenhouse gas reductions, etc.)—this step will support consensus-building within the council, and provide individual members with a level of comfort in adopting a position they can maintain throughout the public process.

- ***Identifying the range*** of less-than-total-truths and myths that are part of most public processes—this will prevent council from being blind-sided and allow members to stay on-point with respect to their perspectives and positions.
- ***Prepare members*** for the overall process, which can be highly emotional and more protracted than most expect—the ability of council to fairly, firmly and consistently address stakeholder questions and reactions lends valuable credibility to the process.
- ***Finally, help the council understand*** that opposition to new policy will likely come from a very vocal but usually small portion of their constituency. Chances are good that an equal or larger portion of the community will be in favor of the proposal (most will be unaware or just plain ambivalent). But it's human nature to be much more passionate about changes we oppose than those we support. As a result, opponents may overwhelm proponents and appear to be the only voice in the process. Leadership should anticipate this dynamic and not be mislead about the level of policy support.

Lafayette, CO, took these steps when it moved from an open to single-hauler contract system. According to Doug Short, Lafayette's public works director, "The public process significantly helped smooth the political process and allowed our council to make a clear decision that supported change." Another Colorado Front Range city initiated a study to evaluate a potential move from an open-market to single-hauler system without spending time preparing their elected leaders. Council aborted the study shortly after the project was started following a barrage of opposition from small haulers and their customers.

Hire a good facilitator—Facilitating an onerous public process requires special skills and good experience with creative and effective strategies for defusing emotional dialogues, encouraging even-handed involvement from all stakeholders, and moving to constructive discussions. Jody Erikson, a senior mediator/facilitator with JSE Associates, advocates an approach that moves the process from an "us versus them" conversation to one that unites stakeholders in a "how can we figure this out together?" environment. Specifically, she notes that a focus on interests versus positions is an important basis for the process; in other words, why something is important (interest) versus a favorite solution (position). For example, when stakeholders simply assert their overall position (e.g., "I'm against any change in the status quo"), staff and council don't have much to work with in terms of discussion and compromise. If the conversation is moved toward what stakeholders' specific interests are, however (i.e., "I am on a fixed income and worried this policy will increase my monthly fees"), there will be more information for discussing and negotiating policy options with less negative impacts.

Provide timely and regular feedback to stakeholders—This step should include a process for sharing documentation (e.g., meeting notices; meeting summaries, documents and presentations; draft policy and report language) and obtaining feedback between public meetings (through hotlines, periodic teleconferences, or other means). This will allow stakeholders to keep current, verify that their input was registered and have a real say in the overall process. The Western Greater Yellowstone Consortium's Regional Recycling Study (currently ongoing in northeastern ID/northwestern WY) has used multiple project liaisons, website postings and regular teleconferences between face-to-face meetings to successfully keep a four-county stakeholder group active and engaged in the project.

For the unprepared, local solid waste policy development and associated stakeholder involvement may, at best, be overwhelming and frustrating with elusive results chased over a prolonged period. A well-strategized public process can be pivotal to new policy that is not only successfully implemented within a reasonable budget and schedule, but leaves staff, council and stakeholders in a frame of mind that is more receptive to the real change process that begins with the final council vote. MSW

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