

# Summit County Construction & Demolition Waste Diversion Pilot

## *Pilot Results*



Prepared for:  
The High Country Conservation Center

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# 1. Introduction

Summit County’s Construction & Demolition (C&D) Waste Diversion Pilot is the result of the recently created 5-Year C&D Waste Diversion Plan in early 2023. The plan lays out various waste-related C&D goals over the next 5 years. One goal, identified by the Board of County Commissioners, was to conduct a waste diversion pilot project with local contractors. VERT Sites, LLC led the project with guidance from the High Country Conservation Center.

The pilot’s objectives were to assess materials management and waste diversion challenges at four Summit County construction, demolition, or remodel project sites from June - November 2023. The pilot analyzed disposal processes and materials management challenges and opportunities at the sites while providing waste diversion technical assistance to participating sites.

The purpose of the pilot was to identify materials generated at construction sites and disposal challenges encountered by builders and contractors for these materials.

The pilot identified 3 goals. Please see Figure 1. below.

**Figure 1: Pilot Goals**

<p><b>Goal 1:</b></p> <p>Determine feasibility of recovering C&amp;D materials from local C&amp;D jobsites and construction industry sector.</p>	<p><b>Goal 2:</b></p> <p>Measure and analyze project and sector waste disposal and landfill diversion potential.</p>	<p><b>Goal 3:</b></p> <p>Identify operational and logistical strategies that can be applied to other county construction, demolition, and renovation projects.</p>
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Pre-pilot planning began in May and the pilot kicked-off mid-June. Please see the pilot’s timeline in Figure 2 for a breakdown of pilot tasks.

**Figure 2: Pilot Timeline**

MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
SUMMER REPORTING		PILOT DURATION			FALL REPORTING		
<p><b>PRE-PLANNING</b></p> <ul style="list-style-type: none"> <li>Solicited general contractors for pilot participation.</li> <li>Secured 4 general contractors</li> </ul>	<p><b>PLANNING &amp; KICK-OFF</b></p> <ul style="list-style-type: none"> <li>Meet with SCRAP and HC3 to pilot kick-off and goal setting.</li> <li>Meet with the pilot’s 4 general contractors and introduce pilot and pilot goals and objectives.</li> </ul>	<p><b>CMMP DEVELOPMENT</b></p> <ul style="list-style-type: none"> <li>Construction Materials Management Plans Development</li> <li>Site meetings and visits</li> <li>Hauler engagements</li> <li>SCRAP visits</li> </ul>	<p><b>CMMP DEVELOPMENT</b></p> <ul style="list-style-type: none"> <li>Construction Materials Management Plans Development</li> <li>Site meetings and visits</li> </ul>	<p><b>CMMP DEVELOPMENT &amp; APPLICATION</b></p> <ul style="list-style-type: none"> <li>Summer Report</li> <li>Site meetings and visits</li> </ul>	<p><b>CMMP DEVELOPMENT &amp; APPLICATION</b></p> <ul style="list-style-type: none"> <li>Site meetings and visits</li> </ul>	<p><b>PILOT CLOSING</b></p> <ul style="list-style-type: none"> <li>Fall Report</li> <li>Pilot closing</li> <li>Site meetings and visits</li> </ul>	<p><b>RESULTS</b></p> <ul style="list-style-type: none"> <li>Final Pilot Report</li> <li>Results shared with pilot stakeholders</li> <li>ZWTF meeting</li> </ul>

Pilot involvement included: The High Country Conservation Center, the SCRAP (Summit County Resource Allocation Park), VERT Sites, material haulers, and the pilot’s four participating general contractors.

The pilot process involved conducting monthly site visits and meetings with general contractor team members, Materials Management C&D technical support and assistance, Construction Materials Management Plans (CMMP), material disposal recording, and hauler engagements.

The pilot also established 9 Key Performance Indicators as part of the pilot process. Please see Figure 3 for the pilot’s Key Performance Indicators. The KPI tables on pages 15 and 16 contain pilot KPI results.

**Figure 3: Pilot Key Performance Indicators (KPI): Materials & Engagement**

<b>Materials Key Performance Indicators (KPI)</b>				
<b>KPI 1:</b> Material and Item Diversion	<b>KPI 2:</b> Landfill Diversion Percentage	<b>KPI 3:</b> Material Segregation	<b>KPI 4:</b> Materials Management Plan Adherence	<b>KPI 5:</b> Innovative Waste Reduction Strategies
<b>Engagement Key Performance Indicators (KPI)</b>				
<b>KPI 6:</b> Pilot Engagement	<b>KPI 7:</b> Jobsite Engagement: Staff	<b>KPI 8:</b> Jobsites Engagement: Trades and Subs	<b>KPI 9:</b> Innovative Waste Reduction Strategies	

**Colorado C&D Debris Diversion**

Colorado communities have been adopting C&D waste diversion requirements for construction and demolition waste generators since 2012.

Summit County is the only Colorado community to conduct a C&D waste diversion pilot with general contractors before implementing C&D waste diversion requirements, though. By understanding the materials generated in the community and the materials management challenges that contractors and builders encounter, Summit County is positioned for significant and meaningful C&D waste diversion.

**Summit County C&D Waste Generation & Diversion Efforts**

Summit County conducted a material composition study in 2018 and estimated that 37% of the generated materials could be diverted.<sup>1</sup> According to the study, untreated wood diversion can potentially contribute to an 18% C&D diversion increase in Summit County.<sup>2</sup> One recommendation identified in the study was to “require C&D recycling on construction sites,” but in order to successfully recover locally divertible materials, it’s pertinent to understand the materials generated and gain a sense of material quantity and generation at local construction sites.<sup>3</sup>

The pilot’s data and recommendations will be utilized for qualitative C&D waste diversion and resource recovery impact at Summit County construction and demolition sites. The concluding recommendations were identified as the best course of actions to increase C&D waste diversion and encourage recovery efforts from general contractors and builders.

1. Souder, Miller, & Associates. Summit County Waste Diversion Study. 3. 2019.  
 2. VERT Sites, LLC. Summit County 5-Year C&D Diversion Plan. Summit County Waste Diversion Study. 2. 2022.  
 3. Souder, Miller, & Associates. Summit County Waste Diversion Study. 2. 2019.  
 VERT Sites LLC | Summit County C&D Waste Diversion Pilot: Pilot Results. 2023

## **2. General Contractors and Sites**

The pilot's general contractors agreed to participate in waste diversion efforts, Construction Materials Management Plans and planning, a monthly site meeting, consultant site visits, and Materials Management trainings with VERT Sites. Table 3 on Page 6 provides additional general contractor information.

It's important to note that all 4 projects entered the pilot during construction and that the multi-family projects will be ending in 2024. The single-family projects are projected to end January 2024 at the latest.

### ***Residential Multi-Family***

The pilot accepted 2 medium to large-size general contractors who build residential multi-family units, buildings, and developments: Summit Homes Construction and Deneuve.

#### ***Summit Homes Construction***

Summit Homes Construction is a Summit County general contractor and developer, and they are one of the largest local developers in Summit County. Summit Homes Construction primarily builds multi- and single-family buildings and developments.

#### ***Deneuve***

Deneuve is a general contractor based in Boulder, Colorado. They build affordable residential multi-family projects along with commercial construction projects. They are one of the largest out-of-county builders and developers of workforce housing in Summit County.

### ***Residential Single-Family***

The pilot accepted 2 custom home builders and remodelers: Ashley Enterprises and Mathison Custom Builders.

#### ***Ashley Enterprises***

Ashley Enterprises is a residential Summit County general contractor who specializes in custom new construction, remodels, and additions for residential and light commercial projects. They build 2-5 houses a year in the Silverthorne and Breckenridge areas.

#### ***Mathison Custom Builders***

Mathison Custom Builders is a Summit County general contractor who specializes in luxury custom homes, remodels, and additions. They typically build and remodel 10-20 homes a year that typically are 2,500 square feet or larger in the Breckenridge area.

**Table 1: General Contractors and Site Information**

General Contractor & Project	Project & Building Type	Project Description	Project Square Footage	Project Start and End Dates
<b>Deneuve: Alta Verde II</b>	Residential: Multi-Family, Development	172-unit workforce housing; new construction of multi-family apartments and buildings	73,5000	Spring 2023 - Fall/early Winter 2024
<b>Summit Homes Construction: Après Shores</b>	Residential: Multi-Family	New Construction of Residential condos; 4 buildings, 70 units	46,000	April 2023 - November 2024
<b>Ashley Enterprises: Soda Ridge</b>	Residential: Single-family Custom Home Remodel + Addition	New master bedroom remodel and expansion	1,200 (addition)	July 2023 - December 2023
<b>Mathison Custom Buildings: Fairways</b>	Residential: Single-family Custom Home Remodel + Addition	Home remodel and new addition	2,400 (remodel) 2,400 (Addition)	April 2023 - December 2023

### 3. Materials and Waste Streams

Not all waste categories or materials are considered a C&D material stream in Summit County, but they are generally accepted as materials generated from construction, demolition, or remodel sites.

Below are common C&D materials that are currently landfilled in Summit County.

- Carpet and Pad
- Gypsum
- Material/item donation (if materials and items are not donated)
- Untreated lumber
- Insulation
- Packaging: plastic film, wrap, and pails

Current Summit County C&D recyclable categories:

- Cardboard
- Scrap Metal
- Concrete
- Asphalt
- Dimensional Lumber<sup>4</sup>

Of the landfilled items, only untreated lumber is recoverable in Summit County. All other listed landfilled materials lack viable end market solutions in Summit as well as most of Colorado.

4. While the SCRAP is working toward the appropriate recovery equipment needed, clean dimensional lumber can be collected at sites and taken to the SCRAP separate from other material streams even though materials might not be processed immediately.

Table 2 shows the pilot material list, materials observed during the pilot, materials that are recoverable in Summit County, and materials that are accepted in Summit County. Dimensional lumber is accepted at the Summit County Resource Allocation Park (SCRAP) but currently not processed for market. Recoverability and material acceptance is based on disposal and material acceptance at local disposal facilities or donation sites.

**Table 2: Material Categories**

MATERIALS	OBSERVED AT PILOT SITES	ACCEPTED AT SCRAP
Scrap Metal	X	X
Concrete	X	X
Asphalt	X	X
Dirt/Fill	X	X
Slash & Stumps	X	X
Cardboard	X	X
Lumber (treated)	X	
Lumber (untreated)	X	X
Pallets	X	X
Mixed Recyclables, e.g., aluminums and cans	X	X
Material/item donation	X	
Material Reuse	X	
Electronic Waste		X
Household Hazardous Waste		X

The only material categories that all 4 sites produced simultaneously during the pilot is treated and untreated lumber.

Single-family projects generated reuse and repurpose items because both projects were home remodels and additions. Remodels, renovations, and additions often produce a myriad of items and materials. Typically new construction projects will generate little to zero materials and items for reuse or repurpose - a goal for new construction projects is not to produce excess materials and items.

While household items were generated in the single-family projects, had the general contractors not found an outlet for some, all items would've been thrown away. This is due to a limited reuse market demand in the area and not having building reuse and resale centers in Summit County. The nearest center would be Habitat for Humanity in Eagle, Colorado or organizations in Front Range communities.

## 4. Pilot Findings

### **Residential Multi-Family General Contractors**

#### **Deneuve**

Deneuve submitted Alta Verde II for pilot participation. Alta Verde II is a multi-family residential development consisting of 4 buildings and will have 172-apartment units upon completion. Alta Verde II earthwork and excavation began in spring 2023. The site entered the pilot during its first month of landfilling materials. Only dirt and other earth-moving materials were disposed before June.

Deneuve opted to segregate their treated and untreated wood, attempted to capture jobsite litter inside the 4 buildings and jobsite trailer, and supported a Construction Materials Managements Plan with technical assistance.

Since the site is being developed in phases, not all buildings will end at the same time and some buildings generated more materials than others depending on the phase the building was in.

Table 3 details the site’s material generation, monthly material generation, and disposal. Table 4 provides details of the types of material categories the site generated.

**Table 3: Deneuve: Alta Verde II Material Disposal**

MATERIAL STREAM	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	TOTAL
Landfill	61,720 lbs.	142,580 lbs.	140,100 lbs.	51,180 lbs.	129,080 lbs.	116,380 lbs.	<b>641,040 lbs.</b>
Recycle	-	-	-	-	10 lbs.	10 lbs.	<b>20 lbs.</b>
Reuse	-	-	-	-	-	-	-
Donate	-	-	-	-	-	-	-
Lumber Segregation	-	-	38,020 lbs.	25,540 lbs.	15,460 lbs.	4,980 lbs.	<b>84,000 lbs.</b>
<b>TOTAL</b>	<b>61,720 lbs.</b>	<b>142,580 lbs.</b>	<b>178,120 lbs.</b>	<b>76,720 lbs.</b>	<b>144,550 lbs.</b>	<b>121,370 lbs.</b>	<b>725,060 lbs.</b>

**Table 4: Deneuve: Alta Verde II Material Generation**

Material List							
Landfill	X	Slash & Stumps		Mixed Recyclables	X	Packaging: Plastic wrap and/or film	X
Scrap Metal	X	Cardboard	X	Material/item donation		Packaging: Plastic pails	X
Concrete		Lumber (treated)	X	Material Reuse		Gypsum	X
Asphalt		Lumber (untreated)	X	Electronic Waste		Carpet and Pad	
Dirt/Fill	X	Pallets	X	Household Hazardous Waste		Insulation	

While highly successful in wood segregation, in the end, all wood materials were landfilled. The objective for wood segregation was the act of segregation and not diversion given that dimensional lumber currently is not processed at the SCRAP yet.



**Summit Homes Construction**

Après Shores is a new construction residential multi-family project with 4 buildings in Silverthorne. The project is projected to end in the fall of 2024. Buildings 1-3 were in the construction phase and building 4 construction will be begin in winter 2024.

Après Shores successfully segregated and recycled over 4,500 pounds of scrap metal in October. The site was hoping to participate in cardboard recycling in November but was unable to do so. The Project Manager will be attempting again by the end of January 2024.

Table 5 details the sites material generation and disposal and Table 6 shows what material categories were on site.

**Table 5: Summit Homes Construction: Après Shores Material Disposal**

MATERIAL STREAM	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	TOTAL
Landfill	44,440 lbs.	48,960 lbs.	49,120 lbs.	39,280 lbs.	33,280 lbs.	39,000*	254,080 lb.
Recycle	-	-	-	-	4,720 lbs.	-	4,720 lbs.
Reuse	-	-	-	-	-	-	-
Donate	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-
<b>Total</b>	<b>61,720 lbs.</b>	<b>48,960 lbs.</b>	<b>142,580 lbs.</b>	<b>178,120 lbs.</b>	<b>76,720 lbs.</b>	<b>144,550 lbs.</b>	<b>258,800 lbs.</b>

\* Aprè Shores November disposal data was not provided. Estimate based on Landfill site disposal mean.

**Table 6: Summit Homes Construction: Après Shores Material Generation**

Material List							
Landfill	X	Slash & Stumps		Mixed Recyclables	X	Packaging: Plastic wrap and/or film	X
Scrap Metal	X	Cardboard	X	Material/item donation		Packaging: Plastic pails	X
Concrete	X	Lumber (treated)	X	Material Reuse		Gypsum	X
Asphalt	X	Lumber (untreated)	X	Electronic Waste		Carpet and Pad	
Dirt/Fill	X	Pallets	X	Household Hazardous Waste		Insulation	

**Multi-Family Takeaways**

Alta Verde II and Après Shores generated hundreds of thousands pounds of materials during the pilot. Alta Verde II is almost two-thirds larger than Après Shores and has a much larger mass of residential unit numbers.

Both projects are constructed in phases. For example, Après Shores Building 4 only had foundation down while buildings 1-3 were in the build phases of the construction process. Diverting materials during building phases, i.e., framing, siding, mechanical, is critical to success. For example, when clean lumber is a primary material that is being generated, space should be allocated for collecting the material during the framing process.

Jobsite space can change and sometimes dramatically. Both multi-family projects began during spring and have now experienced snow, asphalt pouring and paving, constant daily deliveries and trade partners showing, and some dumpster relocations and additions.

Additional takeaways include:

- 10-40 yard-dumpsters are typically used for site materials.
- A dumpster can be serviced multiple times a day, a week, or seldom.
- Diversion and segregation is possible with proper planning and time.

### ***Multi-Family Challenges***

- Space
  - Site space can vary daily and even weekly. Reasons include: weather, deliveries, trades, project phase, excavation, and concrete pouring.
- Communication
  - A site might not always have a Project Manager, Site Manager, or Assistant present and on site all times.
  - Multiple trades and subcontractors can be present all at once or not all.
- Material Generation
  - Both sites generated multiple material streams. However, quantity of materials varied depending on the building phase or phases the site was in.

### ***Multi-Family Successes***

- Material Segregation
  - Both sites successfully segregated materials; Alta Verde II with treated and untreated wood and Après Shores with metal recycling in October. Alta Verde II required assistance and follow-ups throughout the pilot whereas Après Shores was able to collect and divert materials within a week of receiving a dumpster for scrap metal.



- Construction Materials Management Plan (CMMP)
  - Both sites were engaged and interested in a CMMP.
  - Both sites actively participated in the pre-construction planning of a site CMMP.
  - Both sites valued seeing the real-time data tracking and monthly reporting.

### **Residential Single-Family Ashley Enterprises**

Soda Ridge construction kicked off in September. June–August involved earthwork and excavation work. It is estimated that 158,000 pounds of dirt, fill, and slash came from the project. Table 7 details additional information.

Soda Ridge was a new addition and remodel project. Ultimately 1,200 square feet will be added to the home and the master bedroom will undergo renovations.

The project utilized an 8-yard dumpster for all materials. Of the 24-yards of materials that were landfilled, it was estimated that 16–18 yards to have been dimensional lumber.

**Table 7: Ashley Enterprises: Soda Ridge Material Disposal**

MATERIAL STREAM	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	TOTAL
Landfill	-	-	-	340 lbs.	1,000 lbs.	500 lbs.	1,840 lbs.
Recycle	-	-	-	-	-	-	-
Reuse	-	-	-	-	-	-	-
Donate	-	-	-	-	800 lbs.	-	800 lbs.
Other	-	-	158,000 lbs. (Dirt, fill, and slash)	-	-	-	158,000 lbs.*
<b>Total</b>	-	-	<b>158,000 lbs.</b>	<b>340 lbs.</b>	<b>1,800 lbs.</b>	<b>500 lbs.</b>	<b>2,640 lbs.</b>

\*Dirt and fill is not considered “waste diversion” or “landfill” in Summit County and was not calculated in Soda Ridge’s overall material generation.

**Table 8: Ashley Enterprises: Soda Ridge Material Generation**

Material List					
Landfill	X	Slash & Stumps	X	Mixed Recyclables	
Scrap Metal		Cardboard	X	Donations (Materials and items)	X
Concrete		Lumber (treated)	X	Material Reuse	
Asphalt		Lumber (untreated)	X	Electronic Waste	
Dirt/Fill	X	Pallets		Household Hazardous Waste	

### **Mathison Custom Builders**

The Fairways project entered the pilot two months after the project initially began. Like Soda Ridge, it is a single-family new addition and remodel project but double in Soda Ridge’s size. Fairways was the only pilot project where some deconstruction practices could have potentially been applied. The client reused some of the original materials and items and ultimately decided to refinish the floors and not replace them. Even if deconstruction would have happened, no market outlets are available. Currently there are no outlets for deconstructed materials like flooring, cabinets, stone, etc. in Summit County. Please see Tables 9 and 10 for additional Fairways material generation and disposal.

**Table 9: Mathison Custom Builders: Fairways Material Disposal**

<b>MATERIAL STREAM</b>	<b>JUNE</b>	<b>JULY</b>	<b>AUGUST</b>	<b>SEPTEMBER</b>	<b>OCTOBER</b>	<b>NOVEMBER</b>	<b>TOTAL</b>
<b>Landfill</b>	-	4,060 lbs.	-	4,420 lbs.	7,440lbs.	5,220 lbs.	21,140 lbs.
<b>Recycle</b>	-	-	500 lbs.	-	-	-	500 lbs.
<b>Reuse</b>	-	-	925 lbs.	-	-	-	925 lbs.
<b>Donate</b>	-	-	1,750 lbs.	-	-	-	1,750 lbs.
<b>Other</b>	-	-	-	-	-	-	
<b>Total</b>	-	<b>4,060 lbs.</b>	<b>3,175 lbs</b>	<b>4,420 lbs.</b>	<b>7,440 lbs.</b>	<b>5,220 lbs.</b>	<b>24,315 lbs.</b>

**Table 10: Mathison Custom Builders: Fairways Material Generation**

<b>Material List</b>						
<b>Landfill</b>	<b>X</b>	<b>Slash &amp; Stumps</b>			<b>Mixed Recyclables</b>	<b>X</b>
<b>Scrap Metal</b>	<b>X</b>	<b>Cardboard</b>		<b>X</b>	<b>Donations (Materials and items)</b>	<b>X</b>
<b>Concrete</b>		<b>Lumber (treated)</b>		<b>X</b>	<b>Material Reuse</b>	<b>X</b>
<b>Asphalt</b>		<b>Lumber (untreated)</b>		<b>X</b>	<b>Electronic Waste</b>	
<b>Dirt/Fill</b>	<b>X</b>	<b>Pallets</b>			<b>Household Hazardous Waste</b>	

### **Single-Family Takeaways**

- A CMMP would be beneficial but depending on how many homes the contractor builds, it could prove to be overwhelming to perform since custom home builders might not have the labor multi-family or commercial builders have.
- Both Fairways and Soda Ridge projects had to work within HOA rules and guidelines when it came to parking, dumpsters, and equipment.
- There is less disposal impact with smaller projects, e.g., 1,500 square feet or smaller.
- The residential home contractors were able to find outlets for some items that would have been landfilled during the remodel. The outlets were simply either with a trade partner on site or making a couple phone calls.

## Single-Family Challenges

- Space
  - Jobsite space can be trickier and harder to manage than multi-family projects. Additional variables like Homeowner Associations or town rules might create barriers to have additional dumpsters or equipment at a project jobsite.
- Labor/Resources
  - Both Project Managers were either the owner or Co-Owner of the general construction business. They oversaw the pilot project as well as multiple other single-family home projects.

## Single-Family Successes

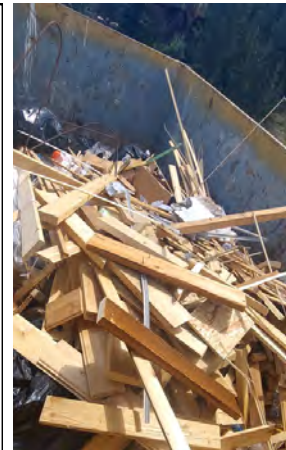
- Material Diversion
  - Both Fairways and Soda Ridge were able to divert some materials from their projects.
- Construction Materials Management Plan
  - Both Project Managers were engaged in the CMMP development and seeing disposal results.



Above and right:  
Soda Ridge site and  
dumpster  
infrastructure.  
Keystone, CO. 2023.



Right: Fairways  
project dumpster.  
Fairways utilized a  
20-yard dumpster  
for all generated  
materials. Pictured is  
about 4-5 yards of  
various lumber, trash  
bags, and plastic  
and cardboard  
packaging.



## Pilot Results

Over 1 million pounds of materials was generated June through November between all 4 sites. Alta Verde II generated the most in material generation and disposal followed by Après Shores. Single-family projects generated the least amount of material categories, however; the most in materials and items for donation, reuse, or repurpose.

## Material Generation

Table 11 details the pilot’s cumulative disposal and recovery numbers and Table 12 provides project site disposal and diversion information with pilot totals.

**Table 11: Pilot Material Stream Totals**

Material Stream	Total Materials	Percentage of Diversion and Segregation <b>9.2%</b>
Landfill	918,100 lbs.	
Reuse	925 lbs.	
Donation (Repurposing)	2,550 lbs.	
Recycle	5,240 lbs.	
Material Segregation (Wood)	84,000 lbs.	
<b>Total Pilot Diverted and Segregated Materials</b>	<b>Total Pilot Materials Generated</b>	
<b>92,715 lbs.</b>	<b>1,010,815 lbs.</b>	

**Table 12: Pilot Sites Material Stream Totals**

PROJECT SITE	LANDFILL	RECYCLE	REUSE	REPURPOSE (DONATION)	WOOD SEGREGATION	TOTAL MATERIAL GENERATION	TOTAL MATERIAL DIVERSION & SEGREGATION
<b>Alta Verde (Deneuve)</b>	641,040 lbs.	20 lbs.	-	-	84,000 lbs.	725,040 lbs.	84,020 lbs.
<b>Après Shores (Summit Homes Construction)</b>	254,080 lbs.	4,720 lbs.	-	-	-	258,800 lbs.	4,720 lbs.
<b>Soda Ridge (Ashley Enterprises)</b>	1,840 lbs.	-	-	800 lbs.	-	2,640 lbs.	800 lbs.
<b>Fairways (Mathison)</b>	21,140 lbs.	500 lbs.	925 lbs.	1,750 lbs.	-	24,315 lbs.	3,175 lbs.
<b>Totals (Pounds)</b>	<b>918,100 lbs.</b>	<b>5,240 lbs.</b>	<b>925 lbs.</b>	<b>2,550 lbs.</b>	<b>84,000 lbs.</b>	<b>1,010,815 lbs.</b>	<b>92,715 lbs.</b>
<b>Totals (Tons)</b>	<b>459.05</b>	<b>2.62</b>	<b>.463</b>	<b>1.275</b>	<b>42</b>	<b>505.41</b>	<b>46.358</b>

The pilot represents a small portion of the overall construction happening in Summit County and may not be indicative of the county’s overall C&D diversion potential. As suggested in the recommendations, a C&D audit should be conducted for a more complete picture. And because all four projects were underway when the pilot began, each site had potentially already landfilled divertible materials.

## Key Performance Indicators

The pilot's Key Performance Indicators were selected to address 2 categories: KPI: Materials and KPI: Engagement. The pilot's KPI's contributed to the pilot's overall framework and how the pilot's process and tasks were completed. The KPI's are not reflective of the industry sector pilot sites build in.

**Table 13: Key Performance Indicators (KPI): Materials**

<b>General Contractor &amp; Project</b>	<b>KPI: Material and Item Diversion</b>	<b>KPI: Landfill Diversion Percentage or material segregation</b>	<b>KPI: Material Segregation</b>	<b>KPI: Materials Management Planning and Participation</b>
<b>Summit Homes Construction: Après Shores</b>	No diversion took place June-mid-September. Scrap metal in October only. Attempted cardboard in November; will try again in December.	< 1%	Will be attempting cardboard collection and segregation in December.	Yes
<b>Deneuve: Alta Verde II</b>	Successful in jobsite beverage container capturing. Successful in capturing some litter from buildings. Jobsite trailer began capturing bottles and can and taking them to the Breck recycle center.	18.5%	Mid-August-October, AV2 segregated treated and untreated wood to address communication and segregation challenges. Highly successful in their segregation and disposal efforts.	Yes
<b>Ashley Enterprises: Soda Ridge</b>	Donated 6 windows and 2 panels to a community member. All other materials or items were landfilled. Attempting cardboard recycling in December.	30%	Will be separating cardboard in December.	Yes
<b>Mathison Custom Buildings: Fairways</b>	Donated 13 windows of various sizes to be repurposed by a community member. The owner reused the original stone and repurposed the kitchen cabinets in the garage for additional storage. The site also diverted scrap metal.	12%	Scrap metal and donated items were set aside.	Yes

**Table 14: Key Performance Indicators (KPI): Engagement**





General Contractor & Project	KPI: Pilot Engagement	KPI: Site Engagement: Staff	KPI: Sites Engagement: Trades and Subs	KPI: Innovative Waste Reduction Strategies
<b>Summit Homes Construction: Après Shores</b>	Experienced a few communication issues with changing of team members and site busyness.	The pilot was initially communicated to vendors and G.C. team but as it progressed, less trades and day laborers knew during site visits.	Minimal but did engage with a few key trade partners.	Utilize a water refill station in jobsite trailer.
<b>Deneuve: Alta Verde II</b>	Brought in multiple team members and trades for site meetings.	Excellent.	Including framers for wood segregation was a key action and most likely the top contributor to the success of wood segregation.	Implemented aluminum can and plastic bottle capturing in jobsite trailer.
<b>Ashley Enterprises: Soda Ridge</b>	Excellent.	Excellent.	Excellent.	Was able to donate some items but Ashley Enterprises commonly tries at projects.
<b>Mathison Custom Buildings: Fairways</b>	Excellent.	Excellent.	Excellent.	Owner decided to reuse and repurpose some of the current materials and items in the home.



## 5. Recommendations

A Construction Materials Management Plan (CMMP) will assist C&D material generators to know, track, and manage their jobsite materials and disposal more efficiently. Disposal requirements on locally divertible materials will help keep valuable resources out of the landfill and contribute to an easy first step in C&D waste diversion efforts. Lastly, the SCRAP ought to carry out the 5-year C&D waste goal of conducting a C&D waste composition study at the facility. This study differs from the 2018 study since the focus would strictly be C&D material disposal and composition. Table 15 highlights the pilot’s key observations broken down by Key Performance Indicator categories of materials and engagement.

**Figure 4: C&D Waste Diversion Recommendations**

<p><b>Educate and Support Contractors</b></p> 	<p><b>Consider Construction Materials Management Plans (CMMP)</b></p> 	<p><b>Implement Policies for Locally-Divertible Materials</b></p> 	<p><b>Complete a C&amp;D audit for a more complete picture.</b></p> 
<p>Local contractors are interested in recycling more, and they would like training and education to learn how to divert C&amp;D materials from the landfill.</p>	<p>Contractors in the pilot program discovered the types and amounts of materials produced at their worksites, as well as identified materials suitable for recycling.</p>	<p>Communities nationwide with successful C&amp;D diversion program have implemented various policies.</p>	<p>A C&amp;D composition audit at the SCRAP will identify types and amounts of construction materials currently being landfilled.</p>

**Additional CMMP recommendations:**

- Make it user-friendly. Pilot general contractor consensus found that the template created was easy to use and follow. Use the template or create one similar.
- Begin with large material generators first, e.g., residential multi-family, commercial construction; consider demolition projects as well.
- If considering residential single-family projects, consider a 2,000-2,500 square foot minimum.
- Provide the technical support and assistance needed to help contractors with a CMMP.
- For additional accountability, a CMMP can be linked with a project's permit or Certificate of Occupancy.
- Provide the data management, reporting, or material tracking tools needed, especially if considering single-family projects as these projects tend to have less resources.
- Provide the necessary community resources, e.g., disposal guidelines, to assist with segregation and contamination issues.

Ultimately, a CMMP will help general contractors know their materials and material generation better, support data gathering, and capture materials that are not readily tracked such as material and item donations, repurpose and material reuse.

**Additional Material Disposal Recommendations:** With proper training, it was proven that material segregation was possible and successful in recovering readily materials and material streams in Summit County. As of now, locally divertible materials include cardboard, scrap metal, concrete, and asphalt.

While Deneuve was highly successful in segregating both treated and untreated lumber together, ultimately the mixture of both falls under SCRAP's Landfill material stream. This is because the SCRAP does not have the proper equipment for handling clean dimensional lumber and other organic wood matter at the time.

Single-family builders separated certain materials such as Fairways setting aside a 500-pound metal beam and taking to the Breckenridge recycle center. Soda Ridge expressed hopes of self-hauling cardboard from the site come December.

- If a project is undergoing a remodel or renovation, encourage material and item donation. Any type of deconstruction requirements would be prove to be difficult if almost futile to carry out by general contractors given the lack of markets and infrastructure for these materials in Summit County and neighboring communities.

## **6. Conclusion**

Tracking and managing materials is a key step in understanding and diverting them. Planning, like what a Construction Materials Management Plan does, can provide a fundamental structure Summit County contractors and builders can follow and apply.

Encouraging recovery of readily divertible materials in Summit County is another initial step to introduce C&D waste diversion and meaningful participation in recovering cardboard, scrap metal, asphalt, and concrete.

While not all materials and material categories are recoverable at this time, it's important to mention that as end-markets and market-demand for materials become more available, Summit County will begin to see materials like gypsum or household items from deconstruction find divertible outlets.

The recommendations and strategies that follow them can be applied throughout various new construction, demolition, or remodel projects in Summit County.