

BOULDER COMMUNITY HOSPITAL

SUMMARY OF DECONSTRUCTION, STOCKPILE AND REUSE

CITY OF BOULDER

SEPTEMBER 2025

By: KL&A Team Carbon, KL&A Engineers & Builders

Project Manager: Alexis Feitel

teamcarbon@klaa.com



KL&A

Engineers & Builders

TABLE OF CONTENTS

1. PROJECT SUMMARY
2. STEEL INVENTORY SUMMARY
3. NEW CONSTRUCTION PROJECTS SUMMARY

BOULDER COMMUNITY HOSPITAL PROJECT TEAM

Salvaged Steel Stockpile Manager, Process Author	Team Carbon of KL&A Engineers & Builders
General Contractor	Ameresco, Inc.
Deconstruction Contractor	Colorado Cleanup Corporation (CCC)
Site and Building Owner	City of Boulder
Salvaged Steel Stockpile Owner	City of Boulder
Collaborators	Full Metal Iron





PROJECT SUMMARY

PROJECT SUMMARY

The city-owned Boulder Community Hospital (BCH), a roughly 250,000 square-foot building, was sustainably and fully deconstructed in 2023. The project achieved 93.5% landfill diversion (via recycling and reuse) of all interior and exterior materials by weight (98% diversion of the core and shell). This is understood to be the first major commercial building to be entirely deconstructed and the first structural steel stockpile of its kind and scale in North America. The primary motivation for circularity was Boulder's Deconstruction Ordinance 8366, which requires decommissioned residential and commercial projects to divert 75% of materials by weight from landfills. The ordinance was developed to support Boulder's goal of becoming a carbon "positive" city by 2040 and zero-waste by 2050.

BCH was primarily comprised of cast-in-place concrete structural systems, constructed in 1957 with numerous additions and renovations through the early 1990s. Two areas had steel structural systems: Source A and Source B. Concrete components were conventionally demolished; however, the material was processed, sorted, crushed, and reused onsite as basement fill (steel reinforcement was recycled).

Source A represents 1986 and 1989 additions, totaling 18,000 square-feet, consisting of three levels above grade, utilizing non-composite steel wide-flange beam and column framing, steel open-web bar joists, concrete on metal deck floors, and metal deck roof. The framing and deck were covered entirely in spray-applied fireproofing. The Source A structural and architectural permit drawings were available, which were utilized to create a digital inventory; however, as-builts, shop drawings, and mill certificates were unavailable.

Source B represents 1982 and 1989 single-story additions, totaling 28,000 square-feet. The structure is one level above grade, utilizing non-composite steel wide-flange beam and column framing, HSS columns, and metal roof deck. Like Source A, the framing and deck were covered entirely in spray-applied fireproofing. Architectural drawings were available but did not include any structural system, member, or material information.

584 wide-flange and tube members (HSS as they are known today) were successfully deconstructed, recovered, stockpiled, and reused, totaling 161 short tons. Roughly 23 additional pieces (607 grand total piece count) were damaged during deconstruction or were too short to utilize, and therefore, they were recycled. These 23 pieces account for 2.1% of the grand total tonnage. Meaning, of the steel that was attempted to be recovered, **98% was successfully deconstructed and reused.** Because of difficulties in effective deconstruction and reuse, steel bar joists, metal deck, and miscellaneous metals were recycled.

See Figure 1 for the general process and workflow. The stockpile was closed August 2025, and all members were procured for reuse. Roughly 40 professionals engaged with the BCH stockpile and reviewed the available inventory. **21 new construction projects, all located in Colorado, reused the salvaged steel**, ranging from non-building structures and small-scale residential renovation projects to multi-story institutional projects, see Figure 2.

16 projects successfully reused the salvaged steel in structural applications, most notably, the City of Boulder's Fire Station 3 successfully installed 89 salvaged members, nearly 25% of the inventory by weight, in its apparatus bay and mechanical screen framing atop the roof. The portion of the BCH building that was maintained, Boulder Western City Campus, is an adaptive reuse project for city offices that will utilize 48 pieces of salvaged steel.

5 additional projects reused the steel in non-structural applications such as art installations, storage racks, and educational material for welder training. 8 projects made piece claims but eventually forewent procuring the salvaged steel.

See Figure 3 and 4 for a material map, detailing the quantity of pieces sourced, recovered, and reused. Direct Tier 1 represents structural reuse in applications that require steel due to structural conditions. The majority of these buildings are multi-story institutional buildings owned by the City of Boulder. Direct Tier 2 represents

structural reuse in smaller-scale applications that do not necessarily require steel, such as single-family residential buildings, shade structures, and retaining walls. Indirect Tier 3 represents non-structural reuse (downgrading functional use of the steel) in applications such as storage racks, art installations, and educational uses.

The following pages include the *Steel Inventory Summary* and *New Construction Projects Summary*, which detail the steel stockpile’s inventory and reuse metrics, such as piece count, tonnage, estimated cost, and Global Warming Potential savings. The *Appendix* includes the final, itemized steel inventory list and inventory legend. Refer to the “Reclaimed Steel Source Assessment” Report, dated February 2024 for further information regarding the steel source, process and methodology, and conclusions.

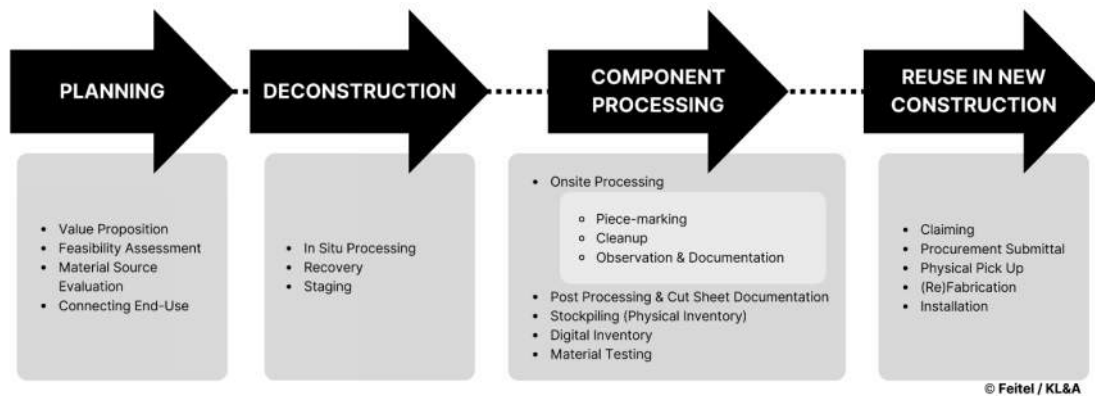


Figure 1: The general process and workflow for the deconstruction, recovery, and reuse of BCH steel.

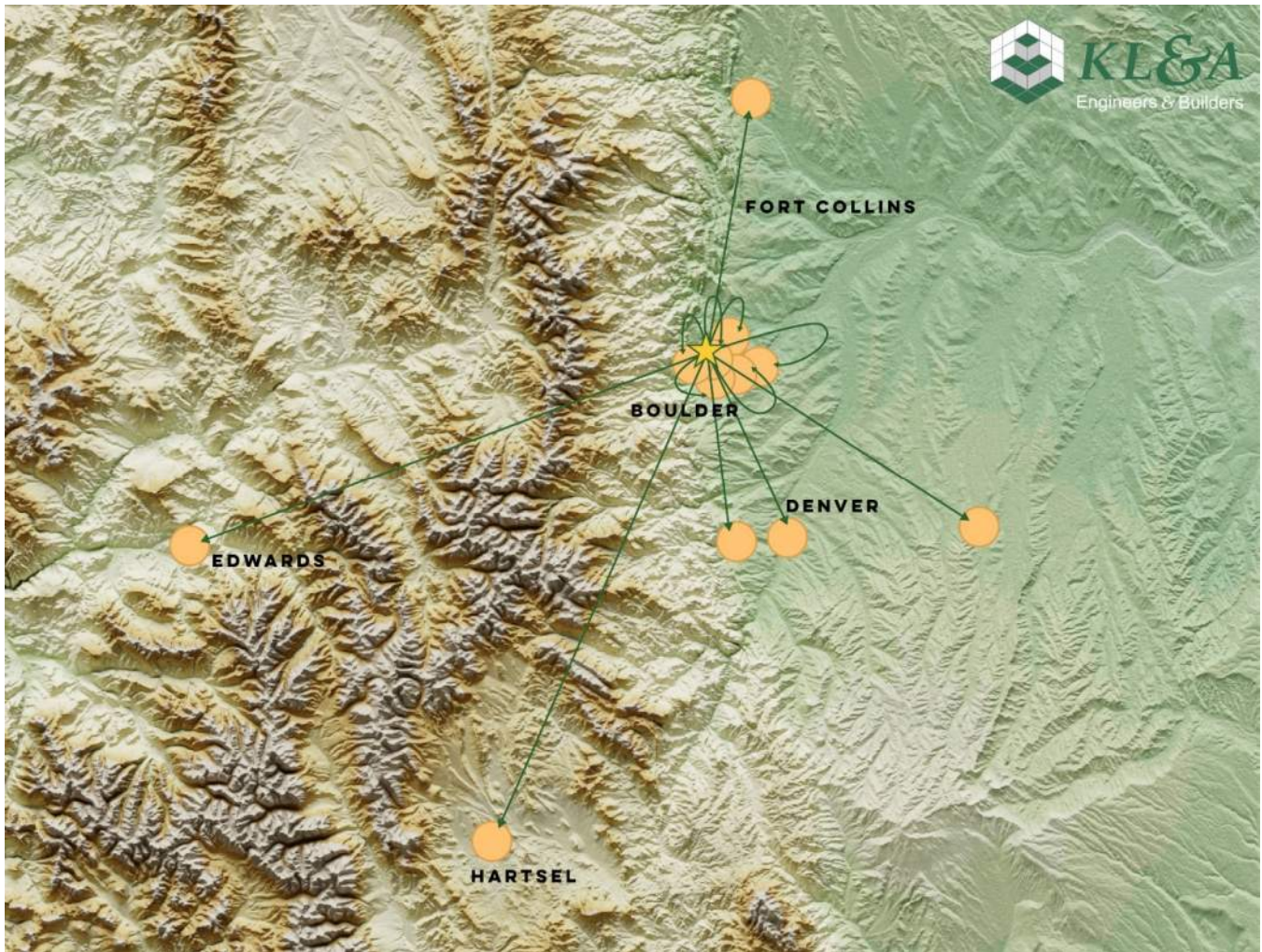
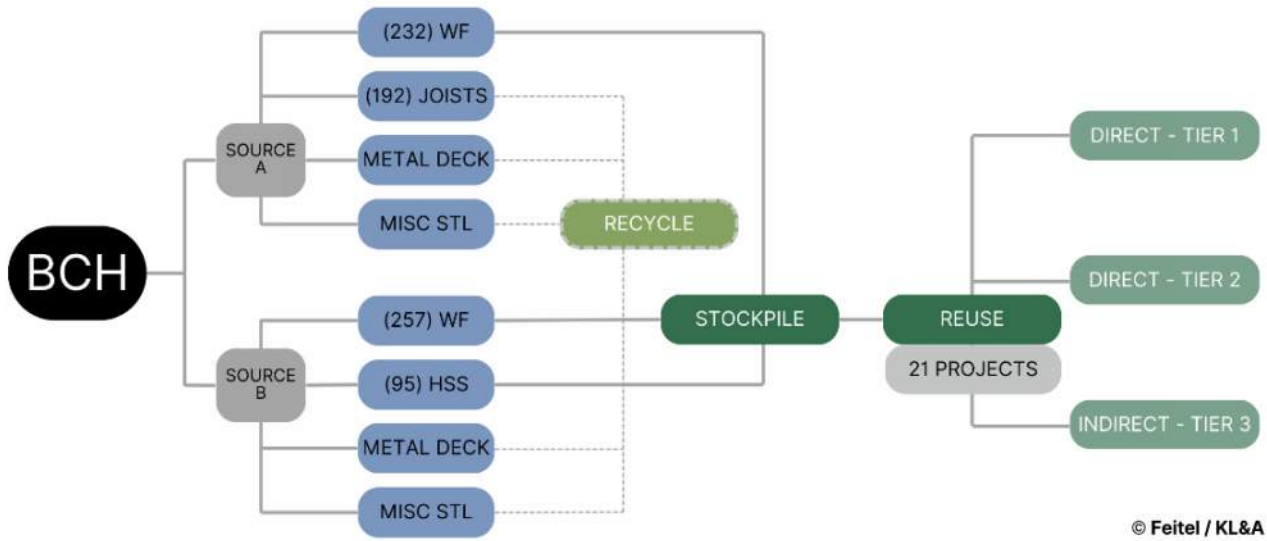


Figure 2: Location map of the stockpile and new construction projects that reused steel.



© Feitel / KL&A

Figure 3: Material map of the steel from source to reuse applications.

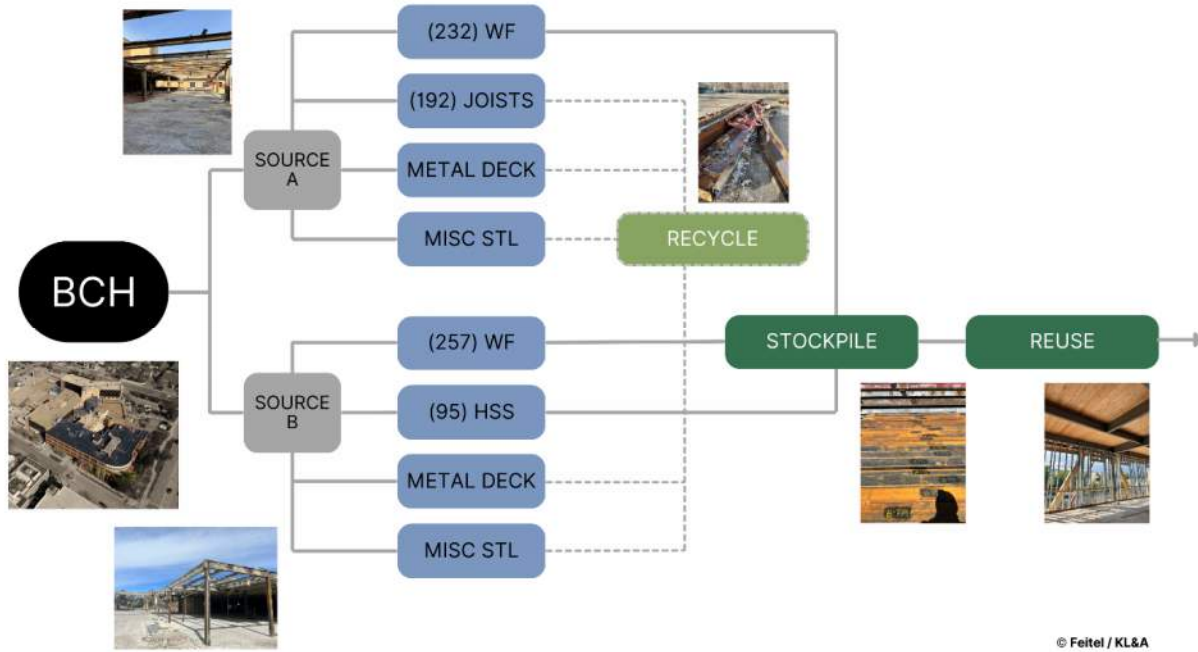


Figure 4A: Exploded material map of the steel source, including piece quantities.

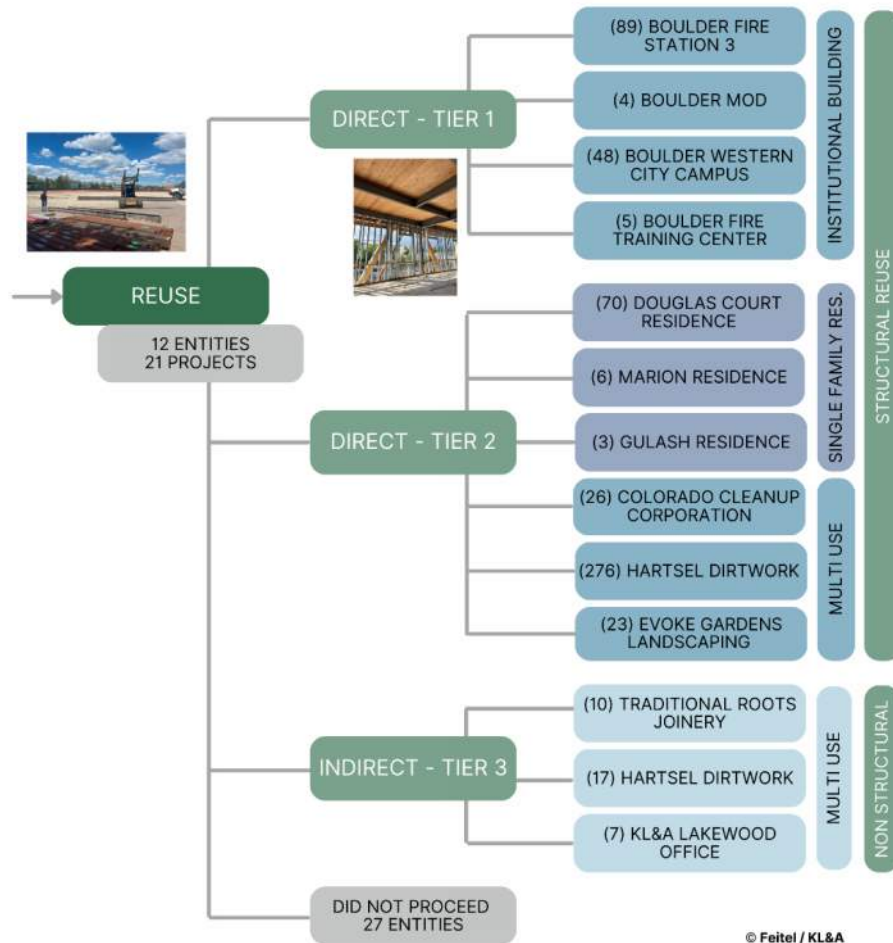


Figure 4B: Exploded material map of the steel reuse, categories, and specification project applications, including piece quantities.

FS3

STEEL INVENTORY SUMMARY



COMPILED INVENTORY SUMMARY

Recovered and Reused Steel Inventory: Compiled Inventory Tracking

Member Type	Count	Total Weight (lb)	Total Tonnage	Claimed Count	Remaining Count	Claimed Tonnage	Remaining Tonnage	Total Estimated Cost	Total GWP Savings (kgCO2eq)
Wide Flange Members	489	292,650	146.3	489	0	146.3	0.0	\$ 219,488	143,363
HSS Members	95	28,570	14.3	95	0	14.3	0.0	\$ 23,570	23,974
Total*	584	321,220	160.6	584	0	160.6	0.0	\$ 243,058	167,338

Notes: *Art pieces are included in the total counts and tonnage above.

Damaged and Scrapped**	23	6,781	3.4
Grand Total	607	328,001	164.0
Utilized	96.2%		97.9%

Notes: **Damaged pieces from Source A and Scrap pieces from Source B are not included in the total count, tonnage, cost, and GWP. See "Scrap Steel Tracking" section for more information.



SOURCE A & SOURCE B INVENTORY SUMMARY

Recovered and Reused Steel Inventory: Source A - OBGYN/ Lab - Inventory Tracking

Member Type	Count	Total Weight (lbs)	Total Tonnage	Claimed Count	Remaining Count	Claimed Tonnage	Remaining Tonnage	Total Estimated Cost	Total GWP Savings (kgCO2eq)
A Wide Flange Beams	172	106,280	53.1	172	0	53.1	0.0	\$ 79,710	52,064
A Wide Flange Columns	60	54,430	27.2	60	0	27.2	0.0	\$ 40,823	26,664
Total Source A	232	160,710	80.4	232	0	80.4	0.0	\$ 120,533	78,729

Damaged Pieces** 3 0.4

Notes: **Damaged pieces are not included in the total count, tonnage, cost, and GWP

Recovered and Reused Steel Inventory: Source B - Single Sotry Northwest - Inventory Tracking

Member Type	Count	Total Weight (lb)	Total Tonnage	Claimed Count	Remaining Count	Claimed Tonnage	Remaining Tonnage	Total Cost	Total GWP Savings (kgCO2eq)
Wide Flange Members	257	131,940	66.0	257	0	66	0.0	\$ 98,955	64,635
HSS Members	95	28,570	14.3	95	0	14	0.0	\$ 23,570	13,996
Total Source B	352	160,510	80.3	352	0	80	0.0	\$ 122,525	78,631

Scrap* 20 5920 3.0

Notes: *Scrap pieces are not included above and not included as a part of the inventory stats



DAMAGED & SCRAP STEEL SUMMARY


Recovered and Reused Steel Inventory: **Damaged & Scrap Piece Tracking**

Member Source	Count	Total Weight (lb)	Total Tonnage	Notes
Source A	3	861	0.4	Tracked in the Source A inventory as "DELETE*" in the Status column
Source B	20	5,920	3.0	Tracked in the "B - SR Scrap Members List"
Total	23	6,781	3.4	

Notes: These pieces are not included in the overall inventory count, cost, or GWP statistics above.

These are all wide flange members.

These numbers do not include all steel scrap and misc metals that may have been recycled.



NEW CONSTRUCTION PROJECTS SUMMARY



Recovered and Reused Steel Inventory: Reuse by New Construction Projects

Total Number of Entities: 12
 Total Number of Projects/Uses: 21
 Total Number of Entities Engaged: 39
 Structural Reuse: 16
 Non-Structural Reuse: 5

Entity/Project Name	Project Keyname	Number of Projects/Uses	Total Claimed Count	Wide Flange Count	HSS Count	Total Claimed Tonnage	Tonnage % of Inventory	Estimated Cost	GWP Savings (kgCO2eq)
Boulder Fire Station 3	FS3	1	89	89	0	37.1	23.1%		36,344
Hartsel Dirtwork	HDW ART/HDW	7	293	244	49	77.8	48.5%		83,956
Boulder Fire Training Center/Tower Project	BFT	1	5	5	0	3.1	1.9%		3,003
Colorado Cleanup Corp	CCC	1	26	12	14	2.3	1.4%		2,774
Boulder MOD, Modular Homes Factory	MHF	1	4	4	0	0.8	0.5%		745
KL&A Lakewood Office	KL&A	1	7	7	0	0.6	0.4%		573
Whitestone/ Douglas Court Residence	DCR	1	70	56	14	11.7	7.3%		11,908
Evoke Gardens Landscaping	EGL	4	23	5	18	2.2	1.3%		3,365
Boulder Western City Campus	BWCC BWCC PV	1	48	48	0	18.8	11.7%		18,400
Nathan Gulash Residence	NGR	1	3	3	0	2.2	1.4%		2,131
Traditional Roots Joinery	RAE	1	10	10	0	2.1	1.3%		2,018
Marion Residence	MRR	1	6	6	0	2.2	1.3%		2,121
Total		21	584			160.6	100%		167,338