PROJECT Green Valley Road Bridge

YEAR
2014

LOCATION
Muskingum, OH, United States

USE
Bridge

CONSTRUCTION
Major Renovation of Existing Structure: Other

ARCHITECT
N/A

ENGINEER
Muskingum County Engineer's Office (MCEO)

DEVELOPER
N/A

BUILDER
TBC

SUPPLIER
N/A

SPECIALISTS
N/A

GROSS AREA
1,040 sq-ft

MEAN ROOF HEIGHT
N/A

STORIES ABOVE GRADE
N/A

STORIES BELOW GRADE
N/A

RISK CATEGORY
II

COST INFORMATION
Partially available

LCA INFORMATION
Unavailable

Credit: Douglas Davis/ Muskingum County, OH

DESIGN FOR DISASSEMBLY	Elemental Subsystems Whole-structure	Non-structural Envelope Balconies Stairs/ramps Foundations Beams Bracing Walls Roof Floors Columns	Other Earthen Wood Steel Masonry Precast concrete Insitu concrete
PRINCIPLE	SCALE	SYSTEMS	MATERIALS
STRUCTURAL COMPONENT REUSE	Whole-structure Subsystems **Elemental** +Deconstruction	Columns Floors Roof Walls Bracing **Beams** Foundations Stairs/ramps Balconies Envelope Non-structural	Insitu concrete Precast concrete Masonry **Steel** Wood Earthen Other

SUMMARY

The Green Valley bridge required replacement due to its poor condition, a 10-ton load limit, and the need for a structure that would allow crane access to construct a bridge project and a new electric transmission line downstream. The Green Valley Bridge was replaced using the different steel members salvaged from another bridge in the county.

SUSTAINABILITY GOALS

The main goal of the project was to provide bridge replacement solutions which were cost effective, safe and environment friendly. The available steel members from another project were in good condition and fulfilled all the technical requirements of the new bridge. No other specific goals were mentioned.

CIRCULAR ECONOMY STRATEGIES

The project required identifying structural steel beams with adequate beam size and strength to span the required length while allowing the hydraulic opening needed for the water traffic underneath the bridge. The available salvaged beams were evaluated to determine the load carrying capacity while also looking at the age and the condition of the beams. The new bridge was constructed with repurposed W33x141, which were cut to length, cleaned of prior attachments and mock tested at the county's faciltiies before they were commissioned to be used for the Green Valley Bridge Project.

Green Valley Road Bridge was one of three bridges built with steel from Pleasant Valley Road Bridge. MCEO's reuse strategy has led to savings of $230,000 from salvaged steel across 7 new bridges in the county as of 2016.

KEY FINDINGS, RECOMMENDATIONS, AND LESSONS LEARNT

The primary lesson was the importance of checking technical adequacy of the material as per the new project where it would be reused. The material should be in alignment with the usage and the dimensional requirements of the target project. Testing should be done to check if the salvaged material is in a good condition and can successfully deliver the servicable life as decided for the new project.

There are several locations where large beams can be found on state and federal systems for reuse. For many projects, it is important to obtain them before they are cut into shorter lengths so they may be resized as per the project requirements. In terms of cost, repurposing can save more than 80% of the cost of purchasing new material depending on the project location and material availability. MCEO saved $51,000 with the Green Valley Bridge Project.

FURTHER INFORMATION AND RESOURCES

https://www.structuremag.org/wp-content/uploads/2016/01/C-StrucSustain-Davis-Feb161.pdf, https://www.shortspansteelbridges.org/ohio-county-finds-creative-sustainable-steel-solutions-for-bridge-replacement/, https://www.structuremag.org/?p=9558, https://worldsteel.org/circular-economy/all/reuse/, https://pdf.archiexpo.com/pdf/short-span-steel/muskingum-county-repurposes-steel-cost-effective-upgrades-to-aging-bridge-inventory/132999-244429.html

AVAILABLE QUANTITATIVE DATA

Bridge Span - 51 feet, Beam Size - 5- W33x141, Source - Pleasant Valley Road, Year Replaced - 2014

$51,000 saved compared to newly-purchased steel.

ABOUT THE DATABASE

This case study has been prepared by the Structural Engineering Institute Sustainability Committee Circular Economy Work Group with the goal of sharing and promoting the excellent circular economy work that project teams are working on throughout North America and the world. Often it is hard to find information on how circular economy principles are implemented in practice; these circular economy case studies aim to better share information amongst the industry.

Some case studies have been prepared directly by a project team member, while others have been prepared based on available texts and publications. In the second case, the text descriptions are a summary of information available from other sources. These sources are referenced in the *Further information and* resources section.

While reasonable efforts have been made to ensure the information is representative and accurate, we cannot guarantee there are no errors. Please contact the case study team to provide additional information, suggest updates and amendments, or with any other questions. To submit a new case study to the database, please use this submission form. Thank you!