Scope of Work for Beltline Highway Project
Use of Recycled Materials and LCA/LCCA

I. Background

The eastbound Beltline Highway (US 12/18) from Whitney Way to Seminole Highway, a 1.5 mile stretch, is undergoing a reconstruction and expansion three lanes from fall 2014 to spring 2016 (Figure 1). The research team proposes to use this project to better determine a methodology for gathering the data needed for the inputs of the life cycle assessment (LCA) and life cycle cost analysis (LCCA) tool, PaLATE, as well as assess the benefits of using recycled materials in the project. The project will be used in preparation for a larger analysis of the I-39/90 reconstruction (CTH A Overpass section, 5 miles). Examples of user inputs include material volumes, road dimensions, equipment used, etc. During past research, the research team has been unable to utilize LCA and LCCA technology without making significant assumptions for the inputs. The Beltline project offers an opportunity to develop a method for data collection that could eliminate assumptions from the analyses.

Together with the Recycled Materials Resource Center (RMRC), the research team has worked with member state transportation departments to determine life cycle cost benefits of incorporating various recycled materials and industrial byproducts in highway construction applications. Previously calculated cost benefits reflect annual system-wide use of quantities for major recycled materials such as fly ash, recycled asphalt pavement, and recycled concrete aggregate. However, the RMRC has yet to analyze individual projects from each member state highlighting the use of recycled materials. This Wisconsin-specific projects present and opportunity to help eliminate all or most assumptions made when analyzing system-wide roadway construction projects.

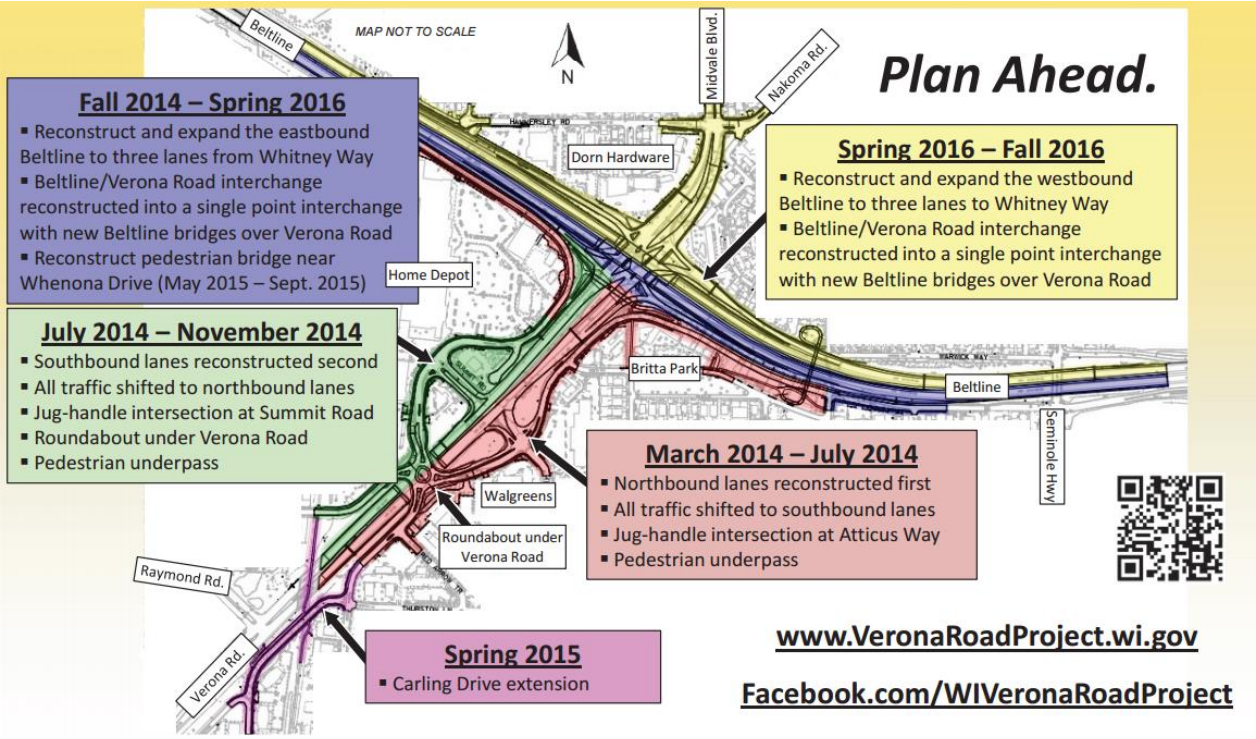

Figure 1. Stage 1 Construction Events for the Beltline and Verona Road from WI DOT. The suggested project is shown in blue.

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II. Objectives

The following are objectives for the eastbound Beltline project:

- Assess the beneficial reuse of recycled materials in the reconstruction and expansion from two lanes to three lanes of a 1.5 mile stretch along the Beltline Highway (US 12/18) from Whitney Way to just east of Seminole Highway.
- Determine proper methodology for gathering the required input data for the LCA and LCCA program, PaLATE, in order to eliminate assumptions in the analysis.
- Gather information to calculate and analyze project benefits.
- Share knowledge gained from this project in preparation for the analysis of larger WisDOT projects on the beneficial reuse and cost savings from using recycled materials.

III. Scope of Work

Task 1: Determine road dimensions from plans for Project 1206-07-84, Mount Horeb-Madison, Raymond Road to Seminole Highway, USH 18, Dane County, Wisconsin; Project 1206-07-85, Mount Horeb-Madison, Madison Beltline Phase 3, USH 18, Dane County, Wisconsin.

Task 2: Gather the following information from the contractors, DOT, equipment manufacturers, and material suppliers either prior to, during, or post roadway construction:

1. Quantities and types of materials used in the project
2. Sources of materials used in the project
3. Processes used for road construction
4. Equipment information collection
    a. Make/model
    b. Equipment fuel use during construction and processing
    c. Material transportation equipment/vehicles and their fuel consumption
5. Pavement mix design
6. Method of disposal for existing roadway material
7. Materials unit costs

Task 3: Assess the benefits of using recycled materials by performing an LCA and LCCA based on gathered data.

Task 4: Prepare a final report and presentation on the LCA and LCCA results to demonstrate how the use of recycled materials saves on emissions, energy, water and dollars. This report should also include a methodology for data collection that may be applied to future projects (e.i. to conduct larger LCAs and LCCAs for WisDOT's I-39/90 project, beginning in fall 2015 and extending tentatively into 2017).