

# Executive Summary, Lake State Railway Senior Design Project

During the 2015-16 school year two groups of undergraduate students conducted “*Planning and Design Services for Improvements to the Lake State Railway Company (LSRC) Saginaw Yard*” as their senior design project (Figure 1). The project was divided to two semesters and each group worked for a single semester. In general, the fall groups were responsible for conceptual designs while the spring groups concentrated on providing more detail to the preferred alternatives. The project involved four main components:

- improvements to the rail system to allow storage of a 9,000-foot unit train in the yard;
- drainage improvements throughout the yard complex;
- design of a covered locomotive wash facility; and
- site work in the rail yard and the neighboring communities to improve yard access and allow LSRC to park the previously mentioned unit train.

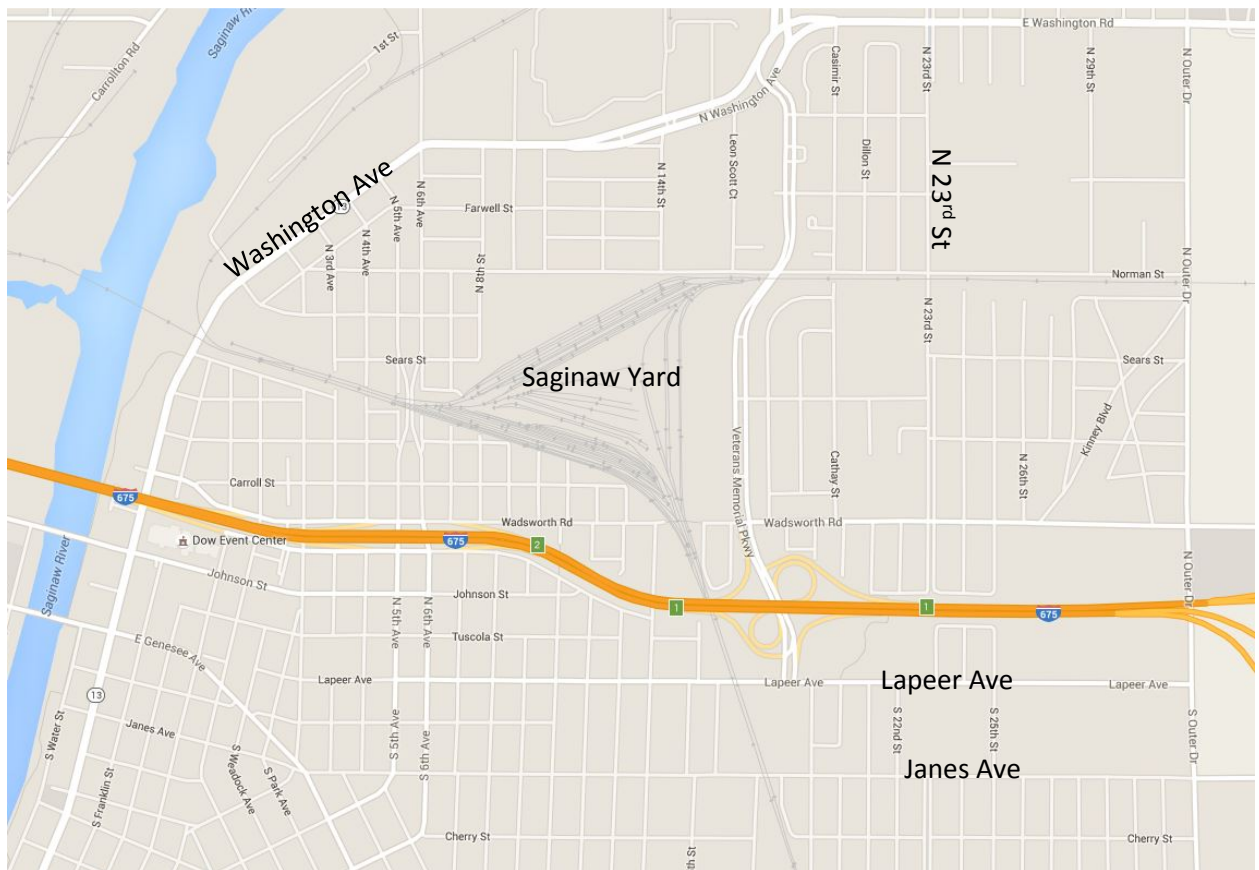


Figure 1- Project Site Map

The initial site visits confirmed the scope outlined in the project description. In addition, LSRC asked the team to look for potential to reuse the floor slab of an old warehouse facility on site, and to take a preliminary look at improvements to the locomotive turntable.

The following paragraphs summarize project activities and findings. Full technical reports from each team are available for MDOT upon request.

**Track Improvements** – After investigation of the site and available options, it was recognized that a 9,000-foot storage track was not possible without closing either N. Washington Ave or Janes Ave, leading into revision of scope that attempted to maximize the length of storage track within the remaining yard area. During the conceptual phase, the best option provided 7,600 feet of storage in the East Yard between Janes Ave and Washington Ave after track modifications, but this was reduced to 7,300 feet during the detailed design phase. 7,300 feet meets the current LSRC needs, and allows them to handle over 110 car trains, while providing room for storage of two trains. The plan also allows for continuous rail operations, even during construction. A schematic drawing was developed to illustrate the East and Receiving yard tracks and operations (Figure 2). Total project costs for rail work were estimated at \$1.4 million during the conceptual phase and later revised to \$1.6 million. The final report includes cost estimates for the planned work, and a phasing plan showing how the work could be accomplished over an extended period of time if necessary.

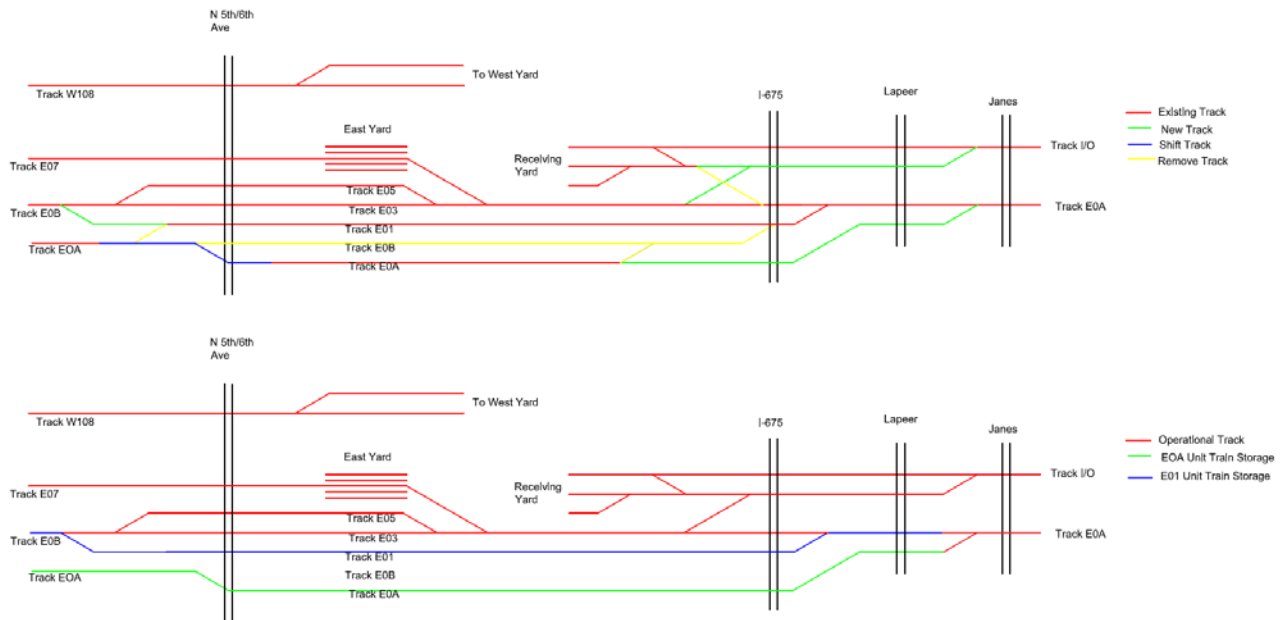
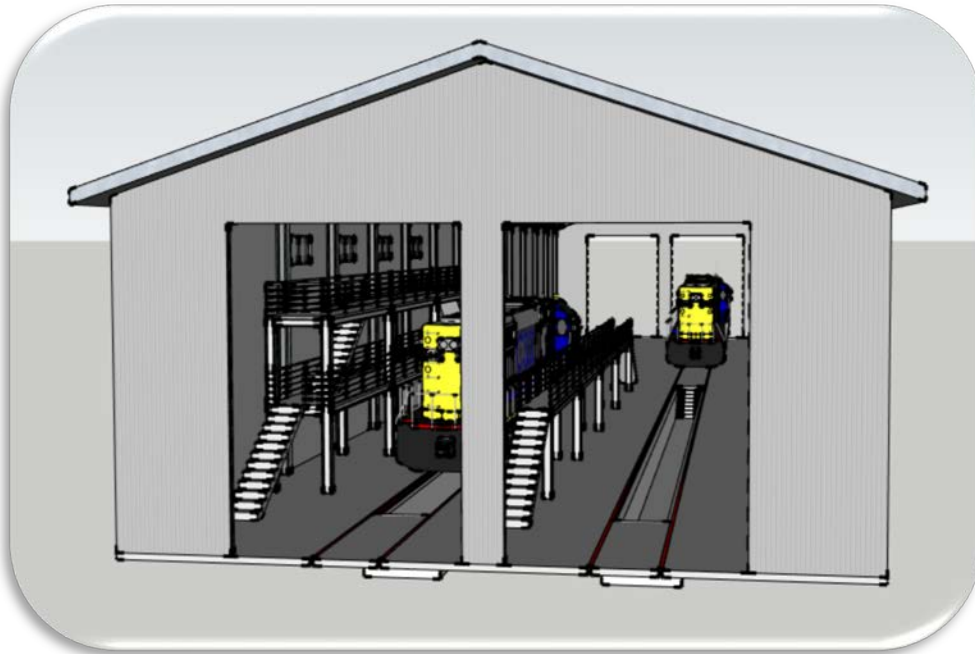


Figure 2- East Yard Rail Schematic

**Structural Improvements** – This group investigated several options for the wash facility, including pre-engineered steel buildings and individual design/construction packages. They found that a pre-engineered facility would be the preferred option. As preliminary design efforts progressed the LSRC staff expressed an interest in including several improvements, including an inspection pit for minor maintenance activities and an elevated wash platform to provide access to the upper sides and top of the locomotive during the wash operations. The preliminary plan that included the layout for a basic wash facility was estimated to cost nearly \$1 million, constructed over two or more years. The final plan increased the cost to just over \$2 million, but included inspection pits for both tracks in the wash bay, drainage improvements to support the inspection pits, heating, and the wash platform and associated wash equipment. It

also included costs for providing more separation between the tracks which allowed better access to the locomotives during the wash process (Figure 3).



*Figure 3 - Locomotive Wash Facility Rendering*

The preliminary analysis of the old warehouse determined the facility's current condition was beyond repair and recommended that the building and floor slab be demolished, crushed, and used as fill inside the existing foundation walls. A floor cap on top of this would allow use as a loading dock for rail operations and addition of a pre-engineered steel warehouse could provide covered storage. Conceptual level costs indicated a total cost for a pre-engineered warehouse on the slab would run nearly \$1 million.

**Drainage Improvements** – The drainage group investigated ways to remove the standing water that collects on the site after major rain events, and during the spring snow melt. They devised a preliminary plan that would provide surface drainage to catch basins established within the yard. The catch basins would be connected to the existing Saginaw combined sewer system at points around the perimeter of the yard. Surface drainage would take place on the existing access roads within the yard that would be regraded to improve surface flow. Preliminary costs for this work ran approximately \$400,000 (maintained in final cost estimate) and could be phased over a period of years to gradually improve the drainage with a reduced annual capital expenditure. Final plans included directional boring from the street side to minimize operational impacts in the yard, grading and drainage for a new access route between the two unit train tracks, and installation of under-drains where possible (Figure 4). A phasing plan was provided that would allow construction over a period of years with recognition that costs would increase as project length was extended.

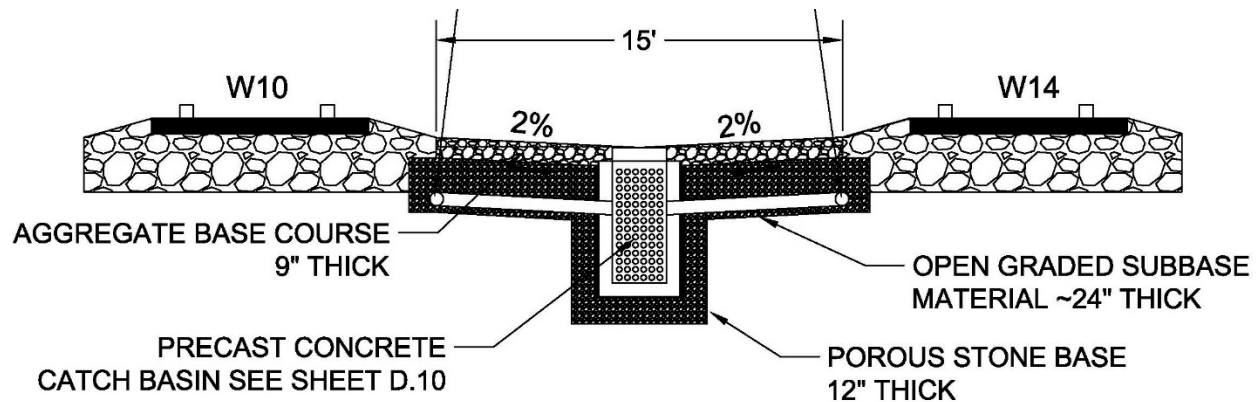


Figure 4- Proposed Drainage Detail

**Site Improvements** – This team focused on improvements to yard access, and to work required to support the proposed unit train operation. Early on the rail and site teams recognized that the rail crossing at either Lapeer or N. 23<sup>rd</sup> street would need to be closed to allow a parked unit train operation. They conducted traffic counts during the field trip, reviewed traffic data from the City and Michigan DOT (MDOT), and concluded that one or both could be closed with minimal impact on current traffic operations as both crossings have low traffic volumes. As MDOT provides a payment to communities that close rail crossings, with a bonus for closing more than one, the team recommended closing both crossings. Their preliminary design work focused on the infrastructure changes needed to successfully close either location. They also proposed a set of local infrastructure improvements that might help secure support for the closures from the local community. Conceptual level costs for the work associated with the crossing closures was a little over \$400,000, which could be offset somewhat by the MDOT incentives that could be as much as \$300,000. As plans were refined the team also reviewed safety issues related to the existing crossings, the crossing closure areas, and local pedestrian traffic. This team recommended closure of two crossings, the first at Lapeer St, the second at N. 23<sup>rd</sup> St. Although only the Lapeer St closure is required for the current unit train proposal, the N. 23<sup>rd</sup> closure would allow more flexibility in the yard operations and advancing both in a single public process may save time and resources. The team’s work also revealed a level of trespassing activity in the yard area which could be addressed through infrastructure changes, combined with coordination with local police and stepped up law enforcement. Proposed infrastructure improvements include fencing like that illustrated by the red line in Figure 5, vegetative barriers at crossing closure locations, creation of park areas with parking on some of the abandoned street pavement, and installation of vehicle gates at yard entrances. Final estimated costs for the site work associated with the crossing closures is a little over \$300,000.

The fall structures and spring site teams also took a preliminary look at the work required to rehab the existing locomotive turntable. They recommended a two-phase approach that would allow continued access to at least two stalls in the round house during construction. Turntable work should take place after the construction of the new locomotive wash and inspection facility, as that facility could be used for some locomotive maintenance activities during rehab of the turntable.

