Wayne Industries Site Expansion

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Wayne Industries approached the Michigan Tech Rail Transportation Program with a request to develop alternatives for expanding their steel warehousing operation in Wayne, MI to better handle changing operational needs.

Project Background

Wayne Industries provides warehousing and transportation of steel coils and aluminum primarily for the automotive industry. Their warehouse in Wayne, MI receives coil cars directly by rail, currently served by Norfolk Southern. They have on site storage for rail cars, and receive unit trains three times per week. The owners anticipate a shift towards more use of aluminum in the automotive industry, and would like to expand their existing facility to handle more aluminum product without compromising existing coil steel operations. Wayne Industries asked a Michigan Tech student team to provide some alternative analysis for options meeting their expansion needs.

Figure 1 - Wayne Industries Steel Facility with rail access

The Michigan Tech team divided itself into three teams to tackle the project. Envision worked on site development factors, JART developed the required rail access for the facility, and Keweenaw Building Solutions provided structural facility design for the new warehouse facility.

Envision

The site development team goals were to successfully manage and create a master plan for the future growth of Wayne Industries. The criteria used to evaluate the possible design alternatives were selected after a site visit to Wayne Industries in order to gain an understanding for the critical areas of operation. Among the most crucial criteria were rail geometry, semi-truck flow, future expansion, and cost of the project. The proposed warehouse required rail access to deliver both steel coils and aluminum blanks, the rail access is essential to Wayne Industries' operations. Transferring product on truck from the warehouse to the customer is equally is also vital which made truck traffic on site just important. Future expansion of the designed site is also vital to allow ongoing development at the site.

Three site design alternatives were explored including warehouses oriented lengthwise in a north/south fashion, east/west manner and angled approach. After further investigation into the logistics of each design, constrained rail geometry for the north/south and east/west designs left the angled option as the preferred alternative.

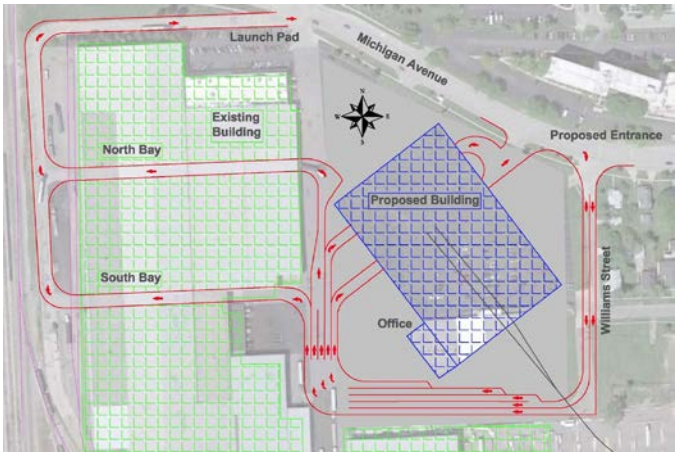

Figure 2 - Angled building site plan

An improved storm water system was designed with new sewer lines beneath the proposed site that tie into the existing city sewer main lines to the east. To prevent flooding inside the warehouse, trench drains are planned along the railroad track at level grade. Truck operations are optimized for each building orientation to improve efficiency. The addition of another exit and one central site entrance will provide a more direct traffic pattern on the site. In addition, local utilities on the site were identified for relocation to compensate for the new building.

JART

JART was tasked with identifying and solving the problems associated with rail access for the new building expansion project. Rapid rail car turnover is key to Wayne Industries position as the steel and aluminum supplier for most of Michigan. Based on discussions with the client it was determined that the operations of the new warehouse would be similar to the existing one, with rail entering on the long axis and truck lanes perpendicular to them.

Rail alternatives were developed for the three building options chosen by the site team. A satisfactory rail geometry was best provided in the angled alternative. Development of final horizontal and vertical alignments required some creative license with the guidelines for industrial yard design. The assumptions for operation included use of a rail car mover within the yard, and 60' design cars being driven at low speeds. This allowed for the elimination of tangent sections of track before and after curves, saving space.

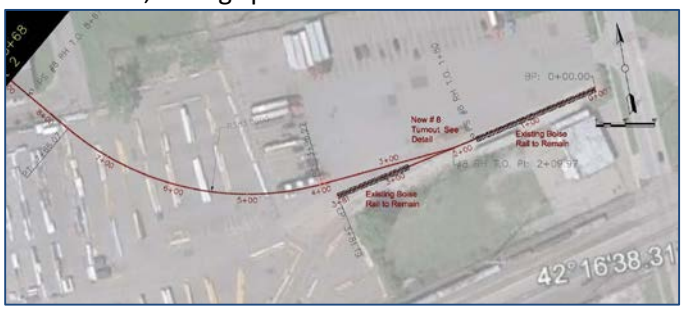

Figure 3 - Horizontal curve to new warehouse site

Shorter #8 turnouts were used to save space. Vertical alignment was a challenge, with a drop of more than five feet required across the constrained access route. The team also used a tighter curve radius than normally included in an industrial site.

Keweenaw Building Solutions

Keweenaw Building Solutions developed a plan that fit Wayne Industry's criteria for the site expansion. The new building will support perpendicular rail and truck access with storage for aluminum and steel. The warehouse function is to store aluminum with the future option of steel storage, thus storage capacity is the primary concern. The preferred design has two-25 foot truck lanes supported by a double track rail configuration down the center of the building. Each track will support four box cars, however the east track will be curved for the first 20 feet into the building. The building includes an option to install two overhead crane bays to support handling of both steel coils and aluminum blanks in the future.

Design constraints for the site included a 50 foot setback from Michigan Avenue and maximizing the length of straight track inside the building. This set the dimensions for the warehouse to 460 feet long by 300 feet wide with an office area extending out from southern corner of the warehouse.

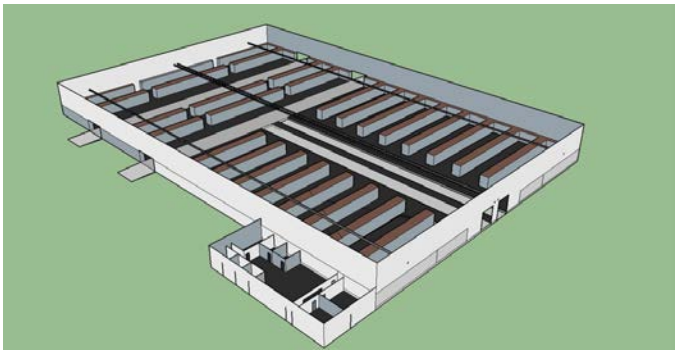

Figure 4 - Warehouse layout with rail access at center

The warehouse floor was designed as an 18 inch thick concrete slab with steel reinforcement meeting the requirements for storing and moving aluminum pallets in the building, forklift operations, and the option to store and handle steel coils in the future.

Recommendations

The Wayne Industries project provided an excellent introduction to the civil design and construction fields for this group of students. Components involving rail activity, highway and site design, combined with facility design and structural analysis offered a wide selection of project activities. Working through the interactions between all of these components was an eye-opening experience for this group! Future capstone projects should include a similar variety of content.