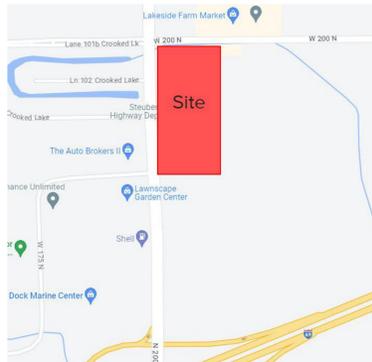


INTRODUCTION

The existing highway facility in Steuben County, Indiana does not have adequate storage for road materials or equipment. The client would like the following improvements: a four (4) lane pumping station with two (2) ten thousand (10,000) gallon tanks, a fourteen (14) bay lean-to for storage, a new salt storage building that includes a large door, and storage areas within the barn for salt, sand, and chemicals, a new retention area, and access lane for trucks and vehicles. The location of this site is shown below.



EXISTING CONDITIONS

The project site is the current location of the Steuben County Highway Department. There are a variety of structures and facilities on the site currently, including two existing buildings, and a salt barn. An office building runs north and south and is the main building on the site. A smaller building, north of the office building, is used for storage.



FIELD WORK

A topographic survey of the existing field and borders was performed using a TOPCON Hyper SR GPS Rover. A topographic site map was then created in AutoCAD Civil 3D to display an accurate site drawing for the site plan design. Four soil borings were also performed to a depth of 5 feet. The soil consisted primarily of sand with trace amounts of clay. Groundwater was not encountered. The topographic map of the site is shown below. Note that north is to the left.



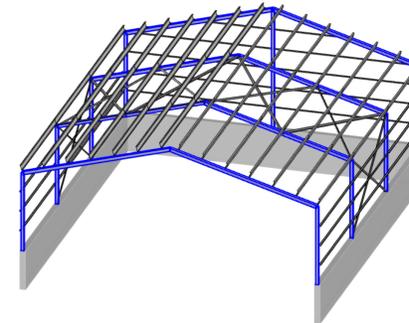
PROPOSED LAYOUT

The site layout was determined based on discussions with the client and following the Steuben County Ordinance. The salt barn will be placed at the location of the existing salt barn, the lean-to structure will be built to the west of the office and will run parallel to the office building. Demolition of the current salt barn will occur to accommodate the construction of the new one. The refueling station is located near the salt barn and in an area that allows trucks to easily pull into and out of the station. A drainage swale will be located in the west yard to maximize stormwater collection. The locations of these features are shown below. North is to the left.



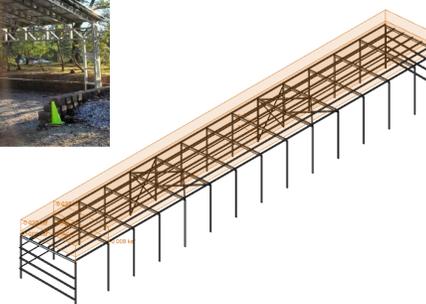
SALT BARN

The client desires that the new salt barn be designed to hold 2000 tons storage for salt and 400 tons storage for salt and sand mix in two separate piles. They also wanted 8 to 10 feet tall concrete perimeter walls for the structure. Using these volumes we determined that a 50' x 60' salt barn would meet the needs of the project. Eave heights were determined by considering clear heights for equipment and salt storage. We recommend an eave height of 24' and a ridge height of 32'-4" using a roof slope of 4:12. Steel moment frame design was performed using RISA 3D, and the structural frame is shown below.



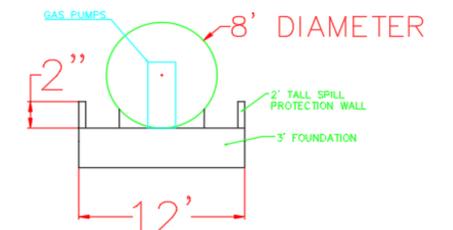
LEAN-TO

The client asked that we design a lean-to to hold 6 pickup trucks, 4 tractor mowers (12 ft wide), 1 boom mower (14 ft wide), and 3 miscellaneous pieces compared to the size of a standard pickup truck. The final design is a lean-to consisting of 13 bays that are each 14 ft wide and one bay that is 18 ft wide. The larger, 18 ft bay is the southernmost bay on the building. The total length of the structure is 200 ft with a depth of 30 ft, resulting in 6,000 square feet. The low eave has a height of 20 ft and the high eave has a height of 22.5 ft. All design was performed using RISA 3D. A photo of a typical lean-to and our frame model is shown below.



FUEL TANKS

Per the client's request, two above-ground 10,000-gallon fuel tanks for gasoline and diesel fuel were incorporated into the layout of the project. They will be located in the paved area adjacent to the salt barn so trucks can easily pull into the refueling station and exit the facility. Spill prevention was incorporated into the design of the refueling station due to the proximity of wetlands and Crooked Lake. This consists of a two-foot high concrete wall surrounding the storage tanks. A photo of a typical tank is shown below along with a schematic of the tank dimensions.



CONSTRUCTION COST ESTIMATE

The following approximate costs were estimated based on values from the 2022 RSMeans Building Construction Costs. Costs shown below may vary based on supplier and time of purchase. The total construction cost was estimated to be approximately \$497,236.

	Cost (\$)
Lean-To	\$129,730
Salt Barn	\$125,125
Refueling Station	\$20,114
Pavement	\$213,160
Site Work	\$9,106
Total Project Cost	\$497,236