EXECUTIVE SUMMARY

The Blue Oval Battery Park is a new greenfield site development project with the initial, primary space as the development area used for an EV Battery Manufacturing Facility by Ford Motor Company. A 970-acre parcel has been identified on the Marshall Mega Site to develop the manufacturing facility. This will include the main cell plant of approximately 2.3 million square feet, support utility buildings, internal roadways, truck access, parking lots, railroad, storm water detention ponds, and buffer zones.

1.0 TRAFFIC ASSUMPTIONS

1.1 Background

The preliminary concept site plan for the assembly plant being designed has an estimated 2,500 employees. As part of planning for infrastructure for the site, the vehicle trips in and out of the site need to be determined to evaluate the internal roadway network needs. Additional proposed traffic volumes for any future development of the Ford site or adjacent industrial properties will be evaluated later. In addition, it has been assumed that all receiving and shipping of materials will be via truck delivery. A proposed rail has been shown on the site plan as a placeholder.

1.2 Trip generation

Based on discussions with the project team, the proposed Blue Oval Battery Park is expected to have 4 shifts with only 2 shifts occurring each day. There will be a total of 2,250 employees between all 4 shifts (563 hourly employees per shift) with an additional 250 administrative/office. Additionally, 50 trucks per hour are anticipated to access the proposed plant.

New trips to be generated by the Blue Oval Battery Park were estimated based on information and procedures contained in the Institute of Transportation Engineer's (ITE) Report Trip Generation, 11th Edition (Web Application Version 6.0 – April 2023). Given that the proposed development is zoned for industrial and is planned to have a variety of industrial facilities onsite, including administrative buildings, the Land Use Industrial Park was used to generate trips for this purpose (ITE Land Use Code (LUC) 130).

Other land uses were investigated for applicability for this site within the Industrial Land Use Group (LUCs 100-199), including LUC 140 – Manufacturing, which is the most similar land use type to LUC 130 – Industrial Park.

However, it was determined that the trip generation estimates using LUC 130 – Industrial Park would provide the most appropriate analysis by predicting the number of trips most closely represented by the expected employee demand per shift. **Table 1** provides the AM and PM peak shift time trip generation summary for vehicle trips for LUC 130.

Table 1. Trip Generation – Vehicle Trips

Land Use	Weekday AM Peak Shift of Generator			Weekday PM Peak Shift of Generator		
	Total	In	Out	Total	In	Out
130 - Industrial Park	848+100=948	774+50=824	74+50=124	770+100=870	133+50=183	637+50=687

Source: Institute of Transportation Engineers, Trip Generation, 11th Edition

As seen in **Table 1**, an industrial park with 2,500 total employees can be expected to generate up to 842 (774 passenger vehicles and 50 trucks) inbound trips on a typical weekday AM peak while Shift #1 is entering and prior to Shift #2 leaving, and 687 (637 passenger vehicles and 50 trucks) outbound trips on a typical weekday PM peak when Shift #1 is leaving and after Shift #2 has arrived. These AM and PM trip values represent the peak traffic demand loads on the study network and are utilized in the ensuing trip distribution and assignment, as well as the subsequent traffic capacity analyses.

1.3 Next Steps

The next step for the traffic study will be developing a proposed conditions traffic model of the internal Ford Assembly Plant network roadway system and the surrounding network adjacent to the site. The generated trips from the Ford Assembly Plant will be added to the existing traffic volumes to simulate the condition when the plant opens. The models will then be used to evaluate internal traffic operations and may be applicable for use in other phases of the projects, including analysis of any phased construction and other proposed conditions at the site.

1.4 Road Design Criteria

Attached is the design criteria used for the roadway geometry layout and referenced standards. The site plans show the road alignment, and a typical road cross-section is included. Both HMA and concrete pavement sections are shown, as it has yet to be determined which sections will be used.

2.0 UTILITY DESIGN CRITERIA AND ASSUMPTIONS

The site plan shows proposed utilities to service the site. Separate discussions have begun with gas, electric, and fiber companies to begin route planning and infrastructure improvements. The site team has also began planning for the site water and sanitary sewer service with the City of Marshall and Stantec. Initial water and sewer demands are still being finalized with the owner. However, a strategy for serving the site with domestic water, fire water, and sanitary sewer service is outlined on the plans and the following outlines initial assumptions.

2.1 Domestic and Fire Water

The City of Marshall will be constructing a five-million-gallon ground storage tank and booster pump station adjacent to the site on the MAEDA property. The ground storage tank will receive water from the west with a 20-inch water main from Battle Creek (Emmet Township) and from the east with a 16-inch water main from the City of Marshall.

The tank will then supply a booster pump station, and two 16-inch water mains will supply water to the site. Please note this work will not be included as part of the site work, but contracted separated by the City. The City of Marshall will own and maintain the water main that parallels Ring Road of the site. This water main is included in the site work, as well as all Ford domestic and fire water lines. Two above-grade meters will feed off this Ring Road water main into the site. The site will have a domestic water feed (Ford domestic water line) for production water and domestic water needs for the building. The Ford domestic water line also serves the onsite fire water tank and pumphouse. This central pumphouse supplies a high-pressure (125 psi) underground fire water main that will feed several fire risers at the production building. We have begun initial hydraulic models for both the domestic water line, Ford domestic water line, and Ford fire water lines with the following assumptions:

- A C-900 pipe average Hazen-Williams C factor of 140.
- The pumps are located two feet off the finished floor in each pump house.
- Simulated 3500 gpm, 4-hour (City requirement) and 2-hour (Ford requirement) fire event with peak potable demand (potable demand of 2.4 mgd, or 1,666 gpm fixed demand).
- Both fire tanks are full during the simulated fire events (300,000 gallons dedicated to fire).
- Only two of the pumps in the Powerhouse are operational at the time of a fire flow event (one inactive).
- Tank 2 will start supplying when Tank 1 is less than 50% full.
- Simulated the events with one of the three reliable sources out of service. Either one of the fire tanks or the direct potable feed was turned off.
- City pumps assumed 1800 gpm at 65 psi (150 TDH).
- Fire pumps rated for 3000 gpm at 125 psi (288 TDH).
- Minimum pressure in City mains is 50 psi.
- Minimum pressure in fire mains 100 psi.
- Minimum flow rate is 2 gpm, with a maximum flow rate of 10 gpm.
- Assuming all mains are open.
- Fire tanks are full at the onset of an event and have time to refill fully before a second event (eight-hour fill, events not compounding).

Please note once updated process water and sewer loads are received from the owner, models will be updated and results shared with the City to confirm service demands and coordinate City booster pump sizing.

2.2 Sanitary Sewer

The City of Marshall will also be extending sanitary sewer service and will construct a two-million-gallon per day pump station on the MAEDA property adjacent to the site. The sanitary sewer shown on the plans is being sized as a gravity pipe and will have an allowance for some future growth. Once service demands are received from the owner, additional information on sewer size, capacity, and future demand calculations will be provided to the City to coordinate with the City's pump station.

3.0 STORMWATER DESIGN AND ASSUMPTIONS

3.1 Existing Conditions

The subject property is currently vacant, previously used for agriculture. Ground cover consists largely of tilled fields with minor impervious areas comprised of paving, houses, barns, sheds, and other auxiliary structures. There are no existing floodways or floodplains delineated on the property, and there are no wetlands present on the site.

Existing topography divides the site into several sub-basins, with two major low points collecting runoff at the south of the site, along the northern edge of the railroad right-of-way. There are existing culverts at both locations. These existing drainage structures are in severe disrepair with highly compromised conveyance capacity. They are also outdated and undersized compared to the large amounts of runoff directed to them. This project proposes to seal and abandon these culverts in place, while providing new and properly sized drainage culverts adjacent to them. These improvements are currently in the design phase and will be provided to the Michigan Department of Transportation (MDOT) and Amtrak for approval prior to construction. The other smaller sub-basins currently drain towards the north. In post-development conditions, much of the runoff from these areas will be redirected to flow south, towards the proposed infiltration basin. The remainder of these areas will be acquired by MDOT, and the associated runoff will be managed by the future roadway improvements to Michigan Avenue.

Existing soils classified using the United States Department of Agriculture (USDA) Web Soil Survey shows the site having a predominant hydrologic rating of Class C soils. For design purposes, Class C soils were used to establish CN values for runoff calculations.

Infiltration rates were also studied at nine locations in the vicinity of the proposed infiltration basins, yielding a median infiltration rate of 0.50 inch/hour. Per the Michigan Department of Environment, Great Lakes and Energy (EGLE) and Calhoun County stormwater requirements, an allowable infiltration rate of 0.25 inch/hour is being used for design calculations.

3.2 Temporary Stormwater Management

As stated, the two drainage culverts at the site's existing low points will need replacing. To temporarily manage stormwater during the construction phase while the new culverts are designed and installed, the onsite permanent infiltration basin will discharge into an offsite temporary infiltration basin via a connecting drainage swale.

This offsite infiltration basin is situated to the east of the project. All runoff up to and including the 100-year rainfall event will be captured and managed using storage provided in both the onsite and offsite infiltration basins. The offsite infiltration basin will have an emergency spillway that discharges towards Bear Creek should rainfall exceed the 100-year storm event. Otherwise, all stormwater runoff will be entirely captured and allowed to infiltrate back into the ground using the basins provided during the temporary condition.

3.3 Permanent Stormwater Management

Once the new culverts at the railroad are constructed and can serve as permanent discharge points to the river, the connecting channel between the onsite and offsite infiltration basins will be taken offline. All portions of the channel will be filled in, with any denuded areas being brought to finish grade and stabilized to establish vegetation. To meet the City of Marshall requirements for stormwater treatment, the onsite infiltration basin will be designed to capture and infiltrate all runoff up to the 2-year rainfall event. For all other rainfall events up to and including the 100-year storm, runoff will be attenuated to be equal to or less than pre-development rates. The post-development condition accounts for runoff at the full buildout of the project, including any proposed impervious area that may be added in future development.

Per EGLE requirements for point discharges into the Kalamazoo River, natural vegetative stabilization practices will be utilized to prevent erosion along the existing drainage course to the riverbank. This includes using stone, seeding, and stabilization matting downstream of the proposed stormwater conveyances.