

Infrastructure Needs

Different industrial projects have **different** infrastructure demands.

Industrial projects require that sufficient infrastructure capacity be available to meet their needs. A community's proximity to population centers and availability of utilities and infrastructure (water, wastewater, transportation facilities, stormwater, and drainage) directly determines the types of industrial projects that can locate there.

Careful consideration must be given regarding the types of users a community wishes to attract and the reality of existing assets, including whether pipes, lines, streets, and soils can accommodate the use. Building new infrastructure is costly, oftentimes in the millions of dollars, so a community should not bond and build too soon without knowing if a user will be able to help pay the debt and support maintenance costs over time through service charges.

Infrastructure requirements that play a significant role in the feasibility of industrial uses have been identified in the following pages. In addition, these tools align with site readiness for industrial users.

Click on the tools below to learn more:

[*6. Site Readiness and Feasibility*](#)

[*7. Industrial Zoning District Guidelines*](#)

[*8. Rezoning and PUDs*](#)

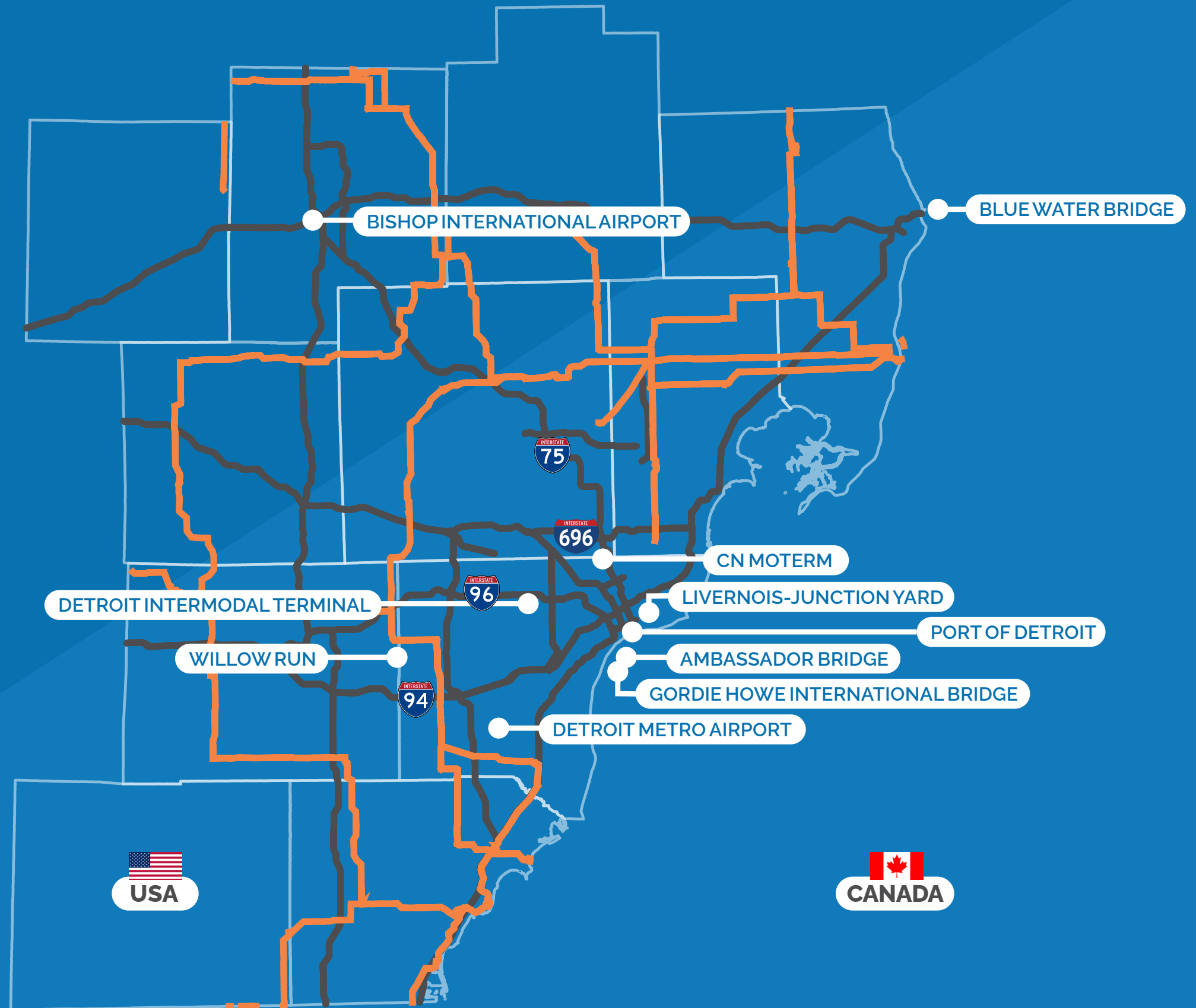
[*9. Site Design*](#)

Mapping the Region

Large transmission lines and the interstate highway system drive industrial development.

Historically, industrial users depended on access to rail and shipping ports to connect to the larger supply chain, but as industry changed, so too did site selection requirements. Today's industries primarily seek access to the interstate highway system and 345 kV transmission lines, the "interstate highway" of the electrical grid.

- 345 kV Transmission Lines
- Interstate Highways



Industrial Infrastructure Requirements of Today

1. Location Requirements

Suitable land. Zoned for the intended industry, with adequate footprint for buildings, laydown areas, and future expansion.

Geotechnical conditions. Soil bearing capacity, groundwater levels, and potential contamination on brownfield sites.

Permitting and land use compatibility. Alignment with the local master plan and zoning, plus permits for rights-of-way, utility easements, and similar approvals.

Worker amenities. Parking, restrooms, changing areas, and break spaces.

2. Water and Wastewater

Potable water. A supply of sufficient volume and quality for the intended process and workforce.

Process water and wastewater. Capacity for production needs, including pretreatment before discharge to the municipal system.

Sanitary sewer. Collection capacity adequate for peak process and workforce demand.

Stormwater management. Drainage systems of pipes, culverts, and grading that mitigate flooding and meet on-site detention requirements.

3. Transportation and Access

Road access. Roads engineered for heavy truck loads, with highway connectivity, adequate turning radii, lane width, and pavement strength.

Rail access. Direct rail where needed, or proximity to intermodal and freight rail facilities.

Port or waterway access. Marine or inland waterway connectivity where relevant to the process.

On-site circulation. Loading docks, staging areas, truck queuing, and parking.

Operational traffic factors. Shift intensities, shift-change timing, multimodal connections, and cumulative traffic impacts on the surrounding network.

4. Utilities

Electrical supply. Adequate capacity, redundancy, stable voltage, and proximity to a substation. Many operations require high voltage or very large loads for heavy machinery, kilns, or large HVAC systems.

Natural gas. Service where required for heating or chemical processes.

Digital infrastructure. High-speed broadband and fiber to support automation, control systems, and connected equipment.

Backup and emergency power. Generators or on-site generation where production or critical systems must stay online.

Specialized process utilities. Steam, compressed air, refrigerant, chemical, and gas systems specific to the production process.

5. Regulatory, Safety, and Compliance Infrastructure

Environmental compliance. Floodplain, wetland, air emissions, and hazardous materials requirements.

Hazardous materials handling. Infrastructure for the storage and use of hazardous materials, including dedicated storage yards where applicable.

Environmental monitoring. Measures to track and mitigate potential negative impacts.

Waste management. Facilities for solid waste disposal, recycling, and chemical waste handling.

Fire protection. Hydrants, fire mains, sprinkler systems, and emergency access.

Security. Fencing, lighting, and surveillance as needed.

6. Resiliency and Redundancy

Redundancy for critical systems. Backup for essential electrical, mechanical, water, and digital systems.

Climate resilience. Design that accounts for flood risk, extreme heat, and severe storms.

Disaster planning. Continuity infrastructure that keeps critical operations viable during disruptions.

What Type of Infrastructure?

This tool provides the infrastructure requirements of six industrial sectors:

- Mobility and Automotive
- Advanced Manufacturing
- Corporate, Professional, and Financial Services
- Logistics
- Research, Engineering, and Design
- Digital Technology

Each requirement is scored from 1 to 5, where 1 reflects a lower infrastructure burden and 5 reflects a greater one. The modifiers below adjust a sector's baseline score to account for site-specific and operational factors.

1. Location Requirements

- Evaluate conformity with land use regulations and consider workforce availability.
- +1 for development types located where a qualified workforce does not exist within a 30-minute commute range
- +1 for sites that require a zoning variance
- 1 for sites permitted by right under the local zoning ordinance
- +1 for sites that are first to market in the region

2. Water and Wastewater

- Evaluate water demand intensity, variability, and criticality. Scores vary based on anticipated water use intensity, measured in gallons consumed per finished square foot per day.
- +1 for sites with a ratio of peak to average water demand greater than 5
- +1 for sites whose operations shut down within two hours of water service loss

3. Stormwater and Drainage

Evaluate anticipated post-development impacts. Scores vary based on the ratio of pre-development to post-development peak stormwater discharge rates. Brownfield sites score higher on this metric, because they already carry more impervious surface than greenfield sites, which means higher existing discharge rates.

4. Transportation and Access

Evaluate the significance of the transportation impact to the mobility network. The tool assumes sectors locate where their mobility demands are best met, so baseline traffic impacts are largely equivalent across types. A logistics facility locates near a critical interchange for direct truck access; a corporate facility locates in an urban area supporting safe multimodal access for employees. Scores vary based on loading impact to the network, quantified using the Equivalent Single Axle Load (ESAL) metric. ESAL accounts for the relative impact of vehicles of different weights, giving a stronger comparison across development types.

5. Utilities

- Evaluate energy demand intensity, variability, and criticality. Scores vary based on anticipated energy use intensity, measured in kilowatt-hours consumed per finished square foot per day.
- +1 for sites with a ratio of peak to average energy demand greater than 1.5
- +1 for sites whose operations shut down within two hours of power loss

Mobility and Automotive

Transportation and Access

This is the lifeblood of automotive operations. Vehicle parts and finished products move by truck, rail, and sometimes barge. Sites that require significant product volumes arriving and departing by semi-truck impose high pavement stress on the local and state roadway network.

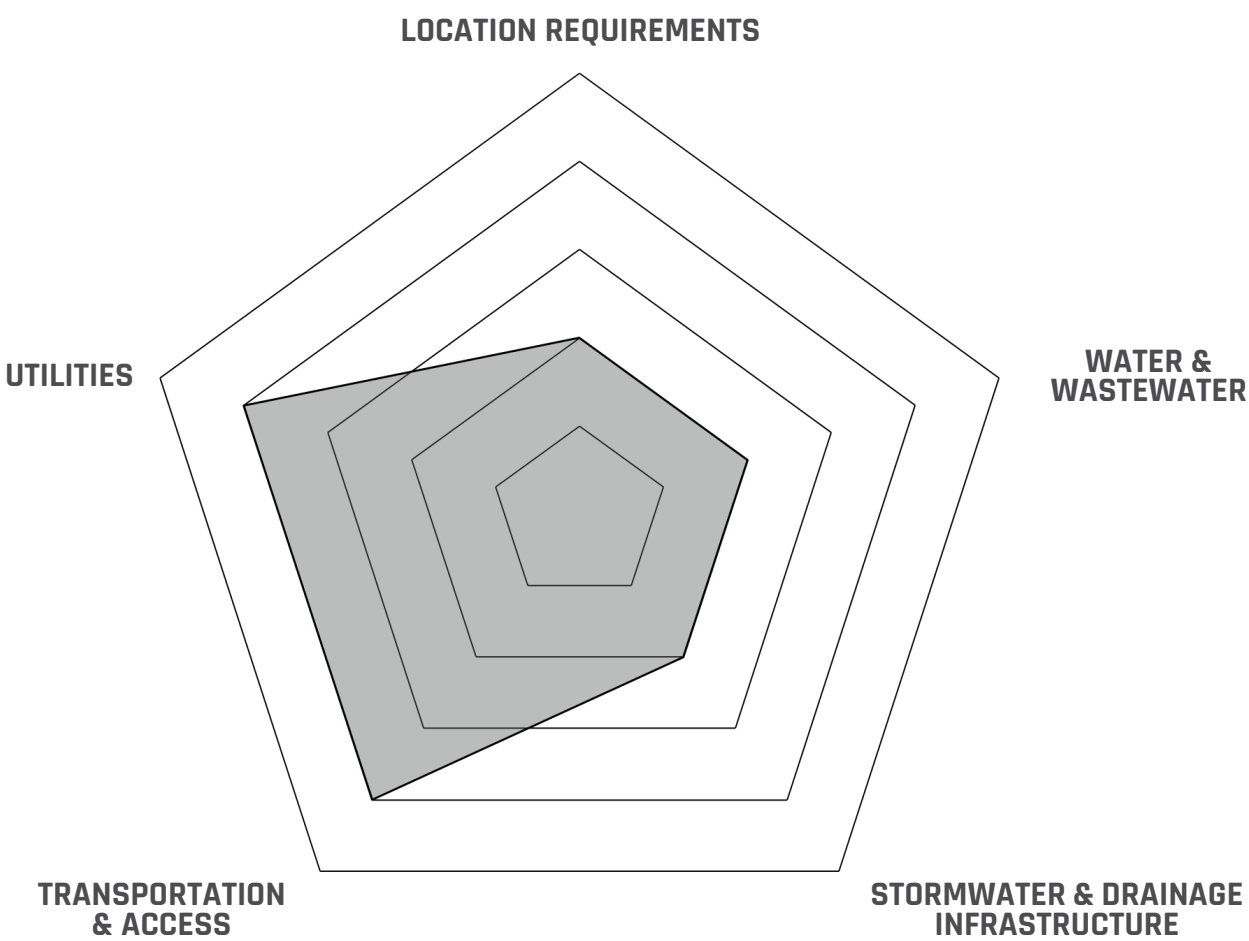
Utilities

Automotive and EV facilities have massive power demand. Robotics, assembly lines, paint booths, and EV battery production are power-intensive. Reliable, redundant electric service, often with dual feeds, is essential, as are gas lines for heating and process use. Energy reliability is non-negotiable for uptime. Uptime is the percentage of scheduled production hours that a plant is actually running and it's a critical metric because a single unplanned outage can idle an entire line, costing thousands of dollars an hour in labor and materials.

Water and Wastewater

Vehicle manufacturing, testing, and battery plants use significant process water for cooling, washing, paint, and chemical baths, and they must treat wastewater before discharge to the system.

Kilowatt-Hour (kWh): Energy reliability is a non-negotiable for production. At approximately 0.30 kilowatt (kWh) per square foot per day, an automotive manufacturing plant carries the second-highest power demand across all typologies. For reference, a refrigerator uses 1 to 3 kWh per day, and a residential central air conditioning system uses between 24 and 40 kWh per day. By contrast, a 4-million-square-foot plant would use 1,200,000 kWh per day.



Infrastructure requirements scored 1 to 5, where 5 reflects the greatest burden. Higher values sit toward the outer ring.

Advanced Manufacturing

Utilities and Power

Consuming 0.25 kWh/sft/day on average, power stability and quality are critical. Advanced manufacturing relies on CNC machines, robotics, and clean room environments that require steady voltage and minimal downtime. Facilities often need redundant feeds, UPS systems, and energy-efficient design, and are often deeply tied to Industry 4.0. Automation, IoT, AI-driven analytics, and real-time process monitoring require strong fiber-optic connectivity, low-latency networking, and strong cybersecurity.

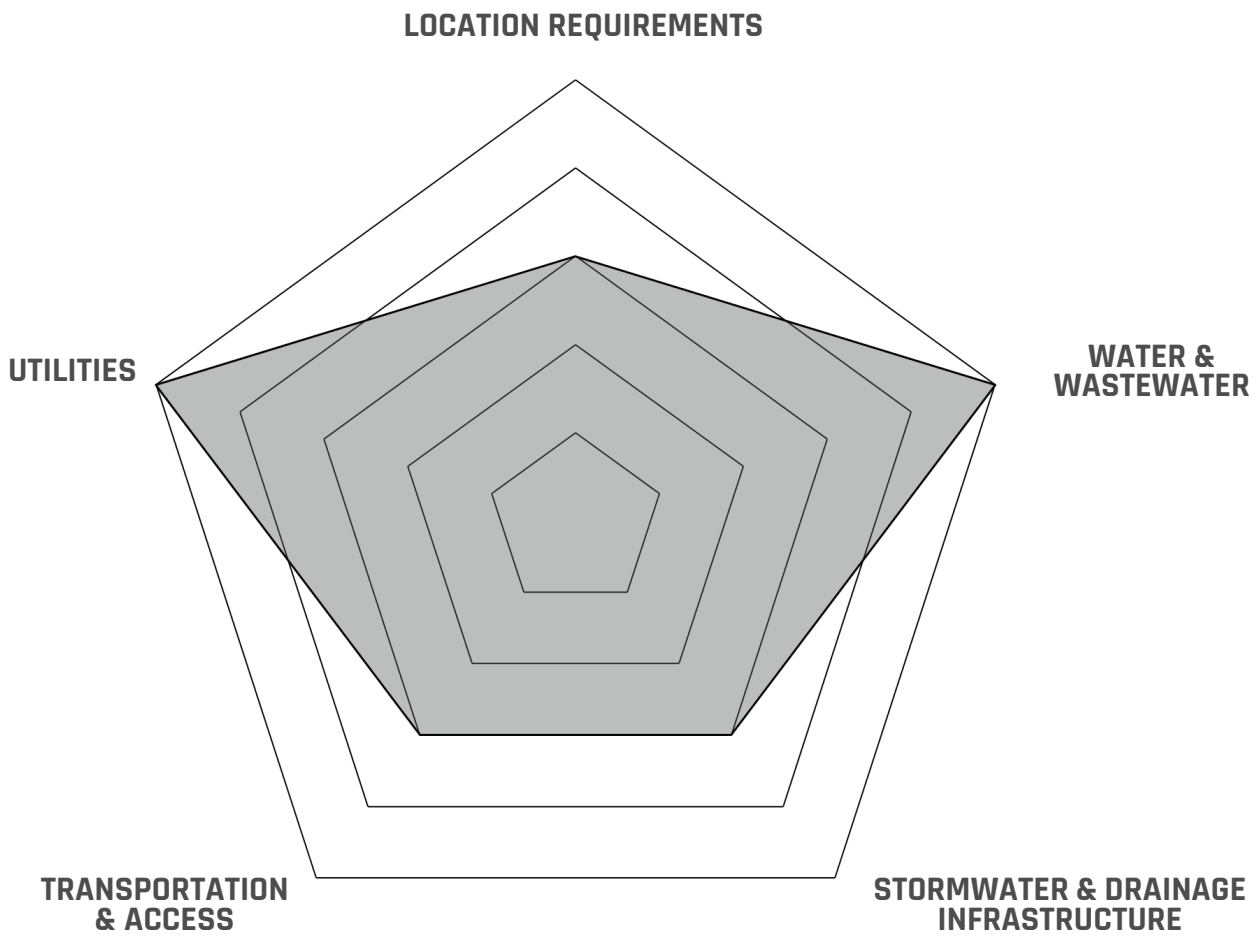
Water and Wastewater

Advanced manufacturing facilities—especially semiconductor fabrication facilities – are significant water consumers. Demand can often be variable, increasing stress and decreasing predictability for the local system.

Location Requirements

Advanced manufacturing typically prefers smaller, more controlled sites than traditional automotive but with high floor-load capacity, expansion potential, and flexible layouts. Clean geotechnical conditions and zoning for tech or industrial use are key, while the surrounding population must include an appropriate number of high-skilled employees.

UPS System: Uninterruptible Power Supply is a connected piece of digital equipment that serves as a battery backup, but also stabilizes power and prevents data loss.



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Corporate, Professional, and Financial Services

Stormwater and Drainage Infrastructure

As sites often have minimal space for on-site stormwater treatment and detention, developments typically maintain, rather than improve upon, the existing discharge rate and volume. If improving stormwater outcomes is a key consideration for a community, thoughtful design elements must be incorporated—often driving up development costs.

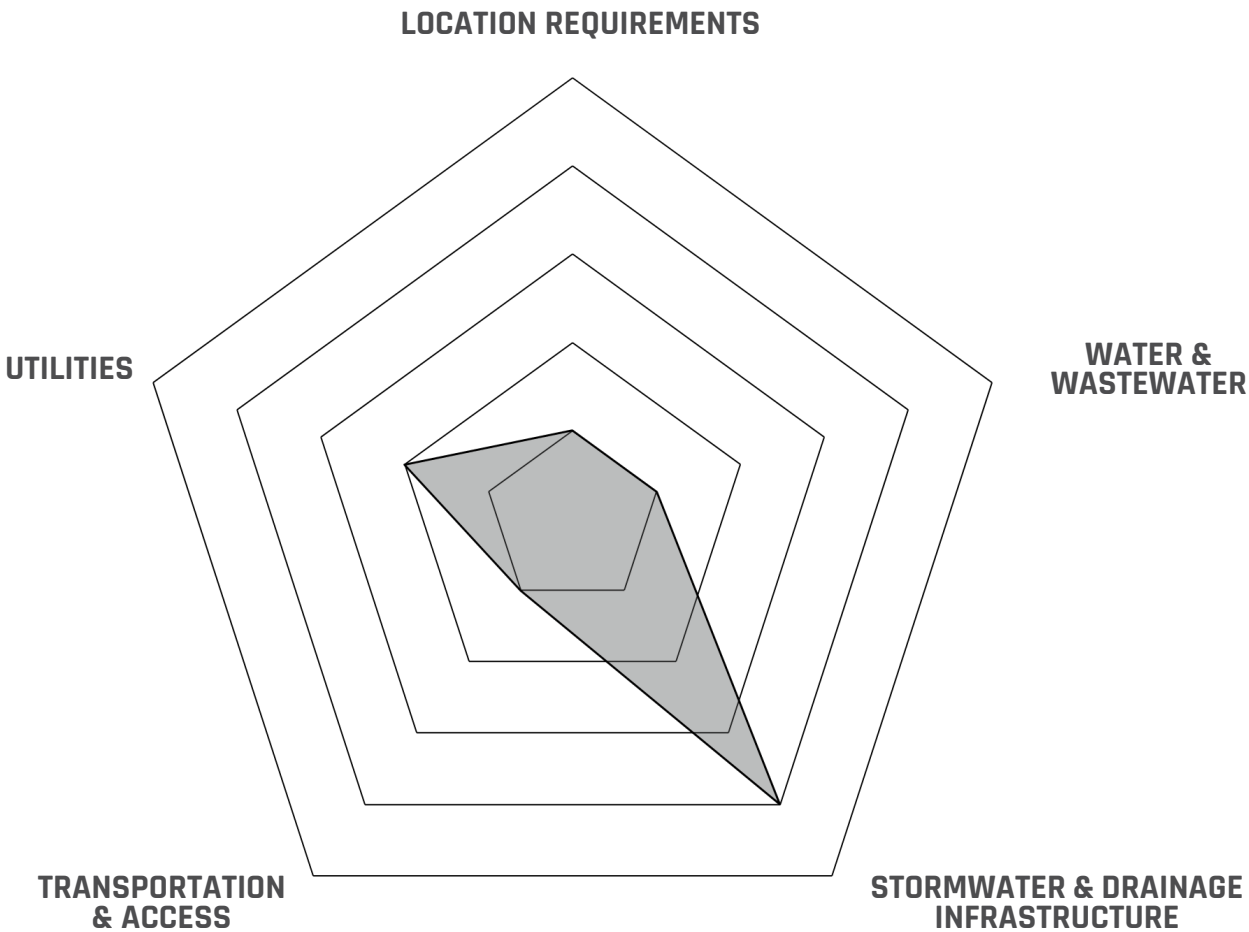
Utilities

This is the backbone of modern professional environments. High-speed, reliable internet and robust network infrastructure are essential for data exchange, cloud computing, remote collaboration, and hybrid work. Fiber redundancy and 5G coverage are key expectations for tenants.

Location Requirements

Corporate projects prioritize location quality, zoning, aesthetics, and expandability. Sites must support efficient building layouts, landscaping, stormwater features, and connections to surrounding districts. The visual and experiential quality of the site often drives investment.

Fiber Redundancy: Akin to a backup generator for a company's telecommunications, fiber redundancy helps prevent interruptions to connectivity.



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Logistics

Transportation and Access

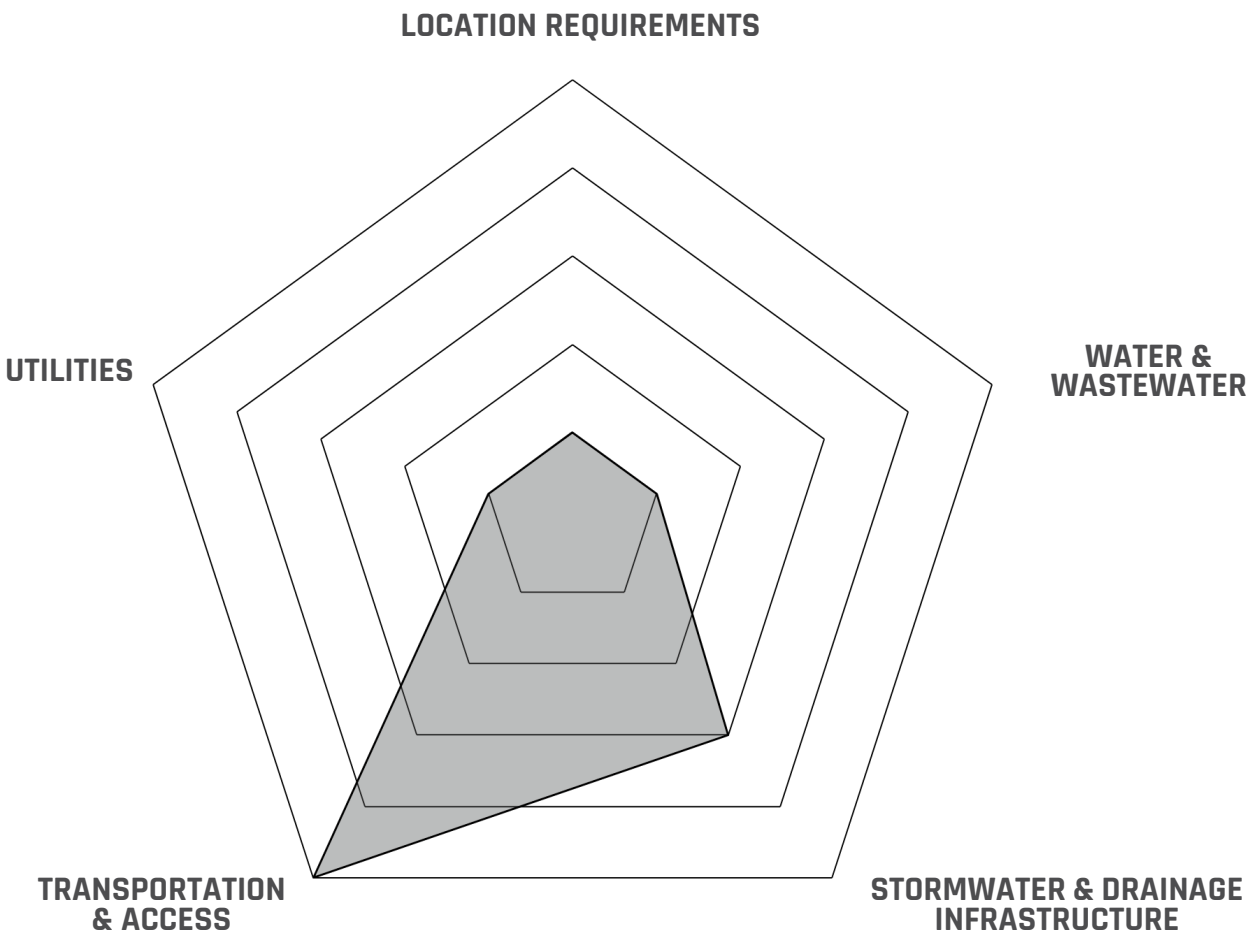
This is the single most critical factor for logistics. Sites must have excellent truck access, wide turning radii, strong pavement sections, and proximity to intermodal rail or air cargo hubs. Generating traffic from about 325 heavy trucks per day along the adjacent roadway network, logistics facilities exacerbate local traffic concerns and pavement stress at higher levels than other development typologies.

Stormwater and Drainage Infrastructure

Similarly to corporate, professional, and financial services, logistics facilities typically do not include significant on-site space to detain stormwater. Sites are more often designed to comply with existing code requirements, which mandate that new development may not increase the peak discharge volume and rate.

Utilities and Power

While not as power-hungry as manufacturing, logistics centers require reliable electrical power for HVAC, lighting, conveyor systems, and warehouse automation. Redundant service and efficient lighting systems (LED) are typical needs.



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Research and Development

Stormwater and Drainage Infrastructure

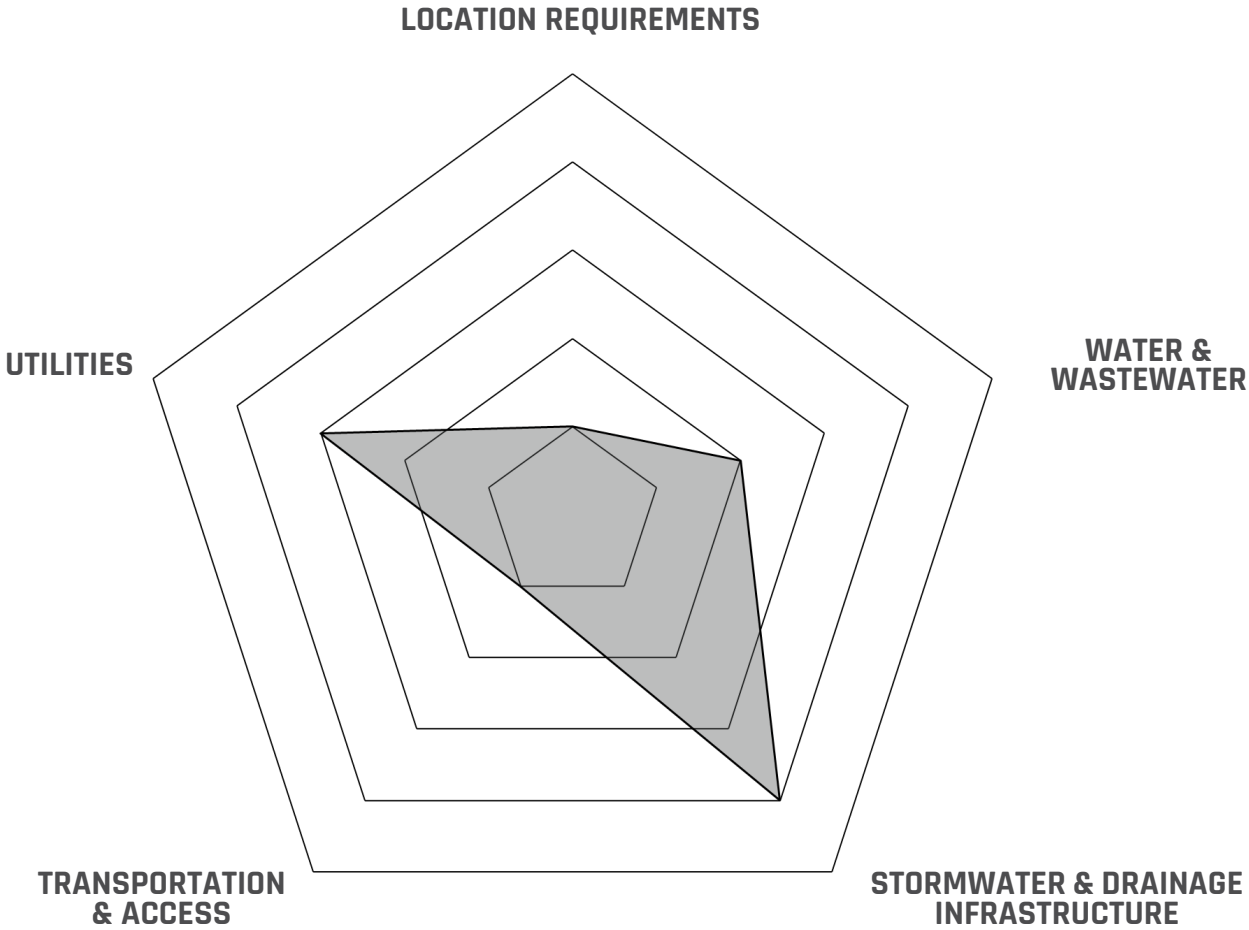
Research and development facilities are where a company invents and improves things, experimenting, building prototypes, and testing them until they're ready for the real world. Similar to logistics facilities, research and development facilities typically do not include significant on-site space to detain stormwater. Sites are more often designed to comply with existing code requirements, which mandate that new development may not increase the peak discharge volume and rate.

Utilities

High-speed, low-latency digital infrastructure is essential. Research and development facilities rely on data exchange, cloud computing, simulation and collaborative platforms. The environments also require clean, reliable power for test equipment, climate control, and precision instruments. Voltage fluctuations or outages can disrupt experiments and sensitive electronics. Backup generators and uninterruptible power supply systems are common.

Water and Wastewater

Research and development facilities can use significant process water and often must treat wastewater prior to system discharge. Water service is oftentimes critical to site operations, with output reliant on consistent and predictable supply.



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Digital Technology

Utilities

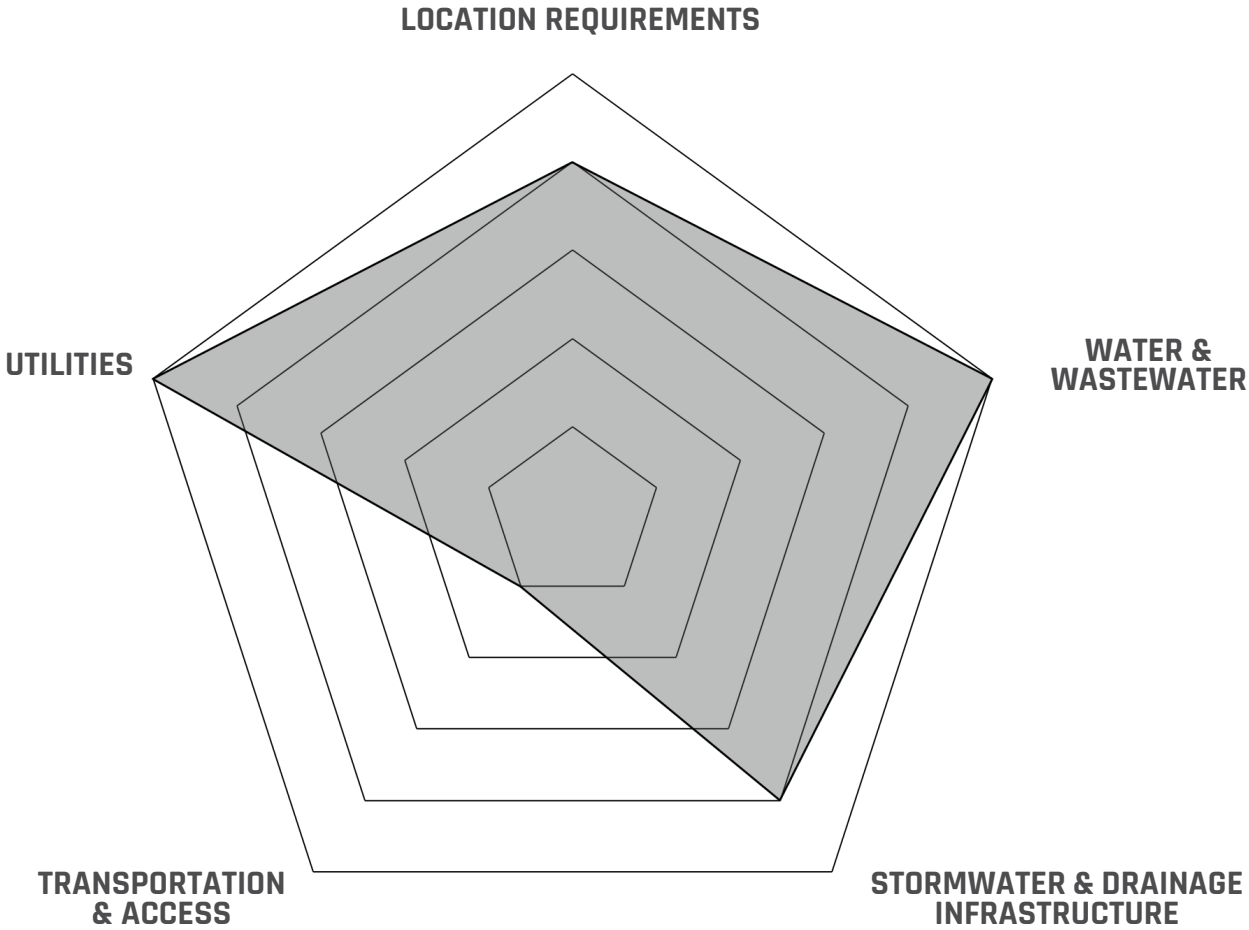
This is the foundation of all digital technology projects. Digital tech facilities (especially data centers) are power-intensive and uptime-sensitive. Reliable, redundant electrical service with backup generation and clean power is critical. High-capacity fiber, 5G, and redundant broadband are essential for cloud operations, data transfer, and uptime (how much time something is actually up and running when the company needs it, as opposed to downtime). Low latency, high bandwidth, and multiple carrier routes are non-negotiable. A 10 MW facility can consume 4.80 kWh/sft/day across a smaller footprint than other typologies—over 15 times higher than the second-highest typology.

Water and Wastewater

Water demand for digital technology sites is also significant, as cooling processes are required to ensure safe site operation. With an average consumption rate of three gallons per square foot per day, and a demand that can often be variable, digital technology centers often strain the local water system as well as the electrical grid.

Location Requirements

Disaster recovery and business continuity define the sector’s success. Power redundancy, multiple telecom feeds, climate resilience, and security systems ensure constant uptime. A skilled local workforce is generally necessary to ensure safe site operations, while the development process can also generate significant local opposition.



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