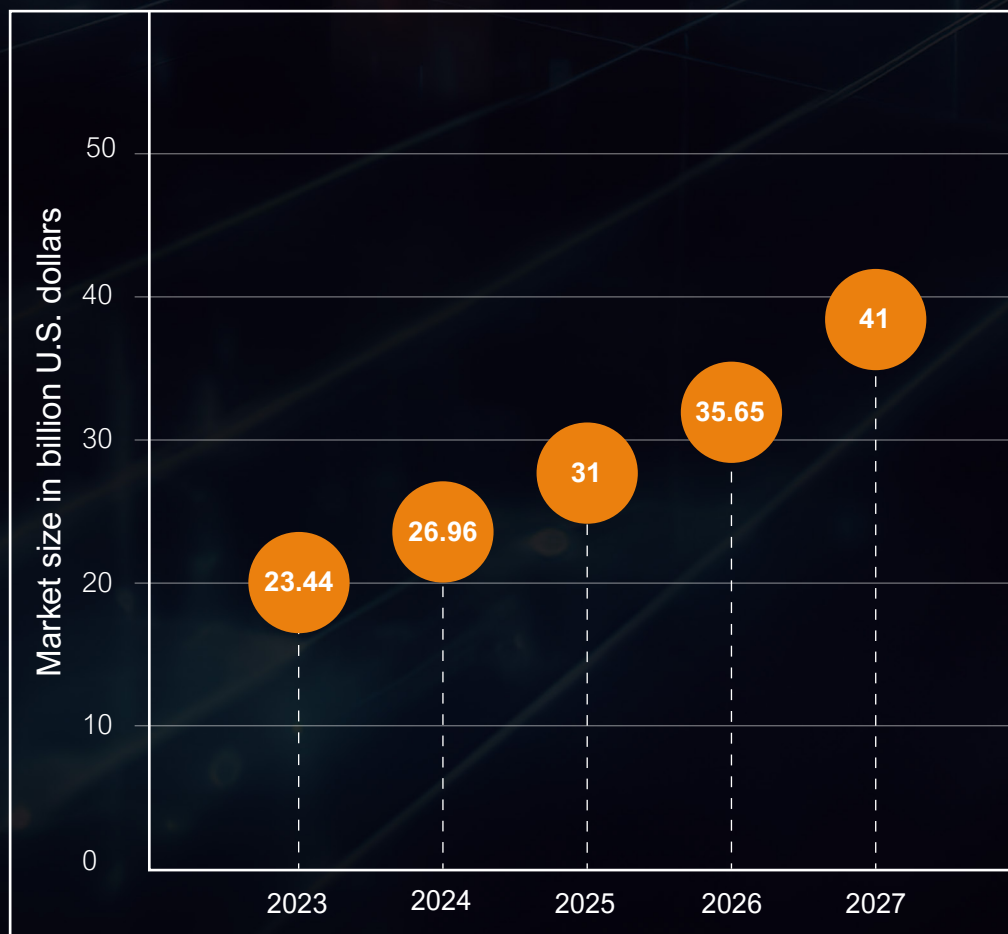# BE ROBOT READY

GREYORANGE'S APPROACH TO SITE PREPAREDNESS

Warehouse Automation is revolutionizing the retail and e-commerce industries and reshaping the way we shop and manage inventory. The global warehouse automation[1] market was valued at over 23 billion U.S. dollars in 2023. It is expected that the market will grow at a CAGR of about 15 percent in the following years and reach the size of 41 billion U.S. dollars in 2027.[1]
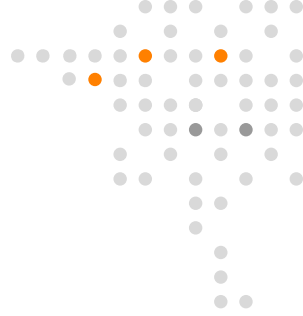
Mordor Intelligence concurs that the European[2] and US[3] regions are both poised for a substantial **14.40%** and **16.70%** industry growth respectively, signaling its immense potential.

At GreyOrange, we are committed to helping you navigate the field of warehouse robotics and automation, and we understand the importance of making information that helps you adopt the technology seamlessly available.

Our approach to site preparation is in-depth and helps you transform your facility into a beacon of efficiency to set the stage for redefining the productivity of your operations.

This document highlights some of the key information that you must be aware of when you are preparing to automate your operations. Following these tips will not only help you prepare your site for mobile robots, but also assist you in capitalizing on the advantages of automation and setting new standards.
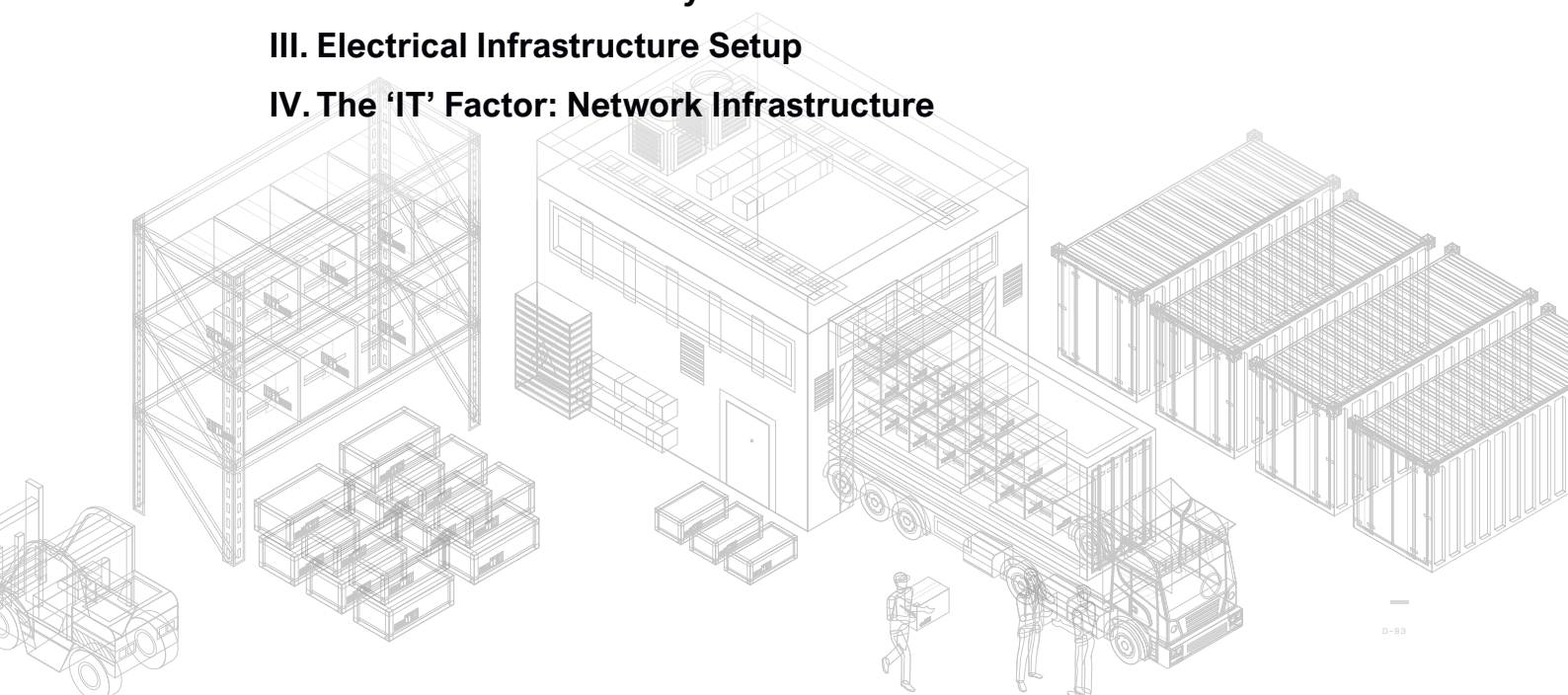
There are four high-level assessments that you can do before implementing robots in your facility to make your deployment more successful:

I.   **Know Your Working Environment**
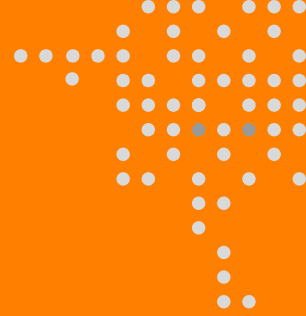
II. **What's Beneath: Facility Floor**

III. **Electrical Infrastructure Setup**

IV. **The 'IT' Factor: Network Infrastructure**

[2] https://www.mordorintelligence.com/industry-reports/europe-warehouse-automation-market

[3] https://www.mordorintelligence.com/industry-reports/northamerica-warehouse-automation-market

I. Know Your Working Environment

For any robotic operation's success, some ideal conditions are required. These conditions could vary slightly depending on your automation partner and their hardware robustness. For GreyOrange's Ranger™ system, some of the key considerations for an ideal working environment are:

Air Quality:

Dust-free, and free from flammable, explosive or corrosive gasses

Static Electricity:

If there are ESD requirements, use electrostatic discharge materials for the floor.

Fluorescent lamp:

< 6,000 lx

Temperature:

0 to 45°C

Altitude:

-60 to 3,000 m

Ambient Lighting:

Avoid direct sunlight

Relative Humidity:

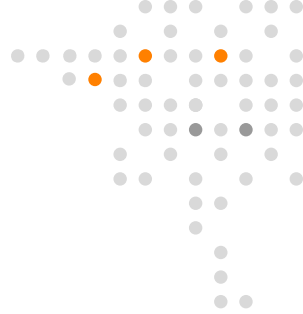5% to 95% RH (no condensation)

Halogen/ mercury lamp:

< 10,000 lx

Service Environment:

Indoor

Apart from this, the quality of the flooring is crucial for optimal automated mobile robot (AMR) performance, as they excel on flat and even surfaces.

II. What's Beneath: Facility Floor

For seamless and smooth operation, AMRs require an even surface that is free from unevenness, gaps or joints. Our Ranger series has an excellent obstacle detection system to avoid things like pillars or boxes, but the quality of the flooring is crucial for optimal navigational performance.

Safeguarding against potential damage from liquid spillage, dust and rodents is another important consideration you must manage when adopting automation.
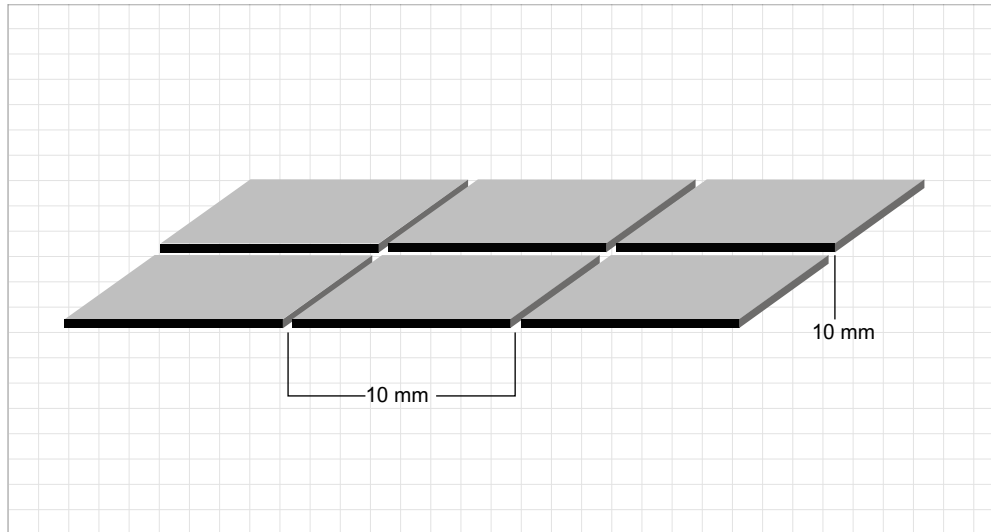
Surface regularity:
• Vital for seamless operations.
• Irregularity may reduce speed and affect productivity.
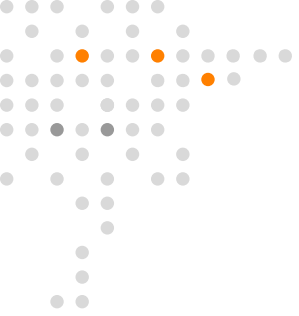
Recommended gap

• Normal operation: 10 mm.

• A gap of 30 mm? A rework is recommended for wheel longevity.

Saw cuts:

• Fill all saw cuts for joint protection.

Joint filling (within 12 months of deployment):

• Fill with Shore A hardness 40.

• Older than 12 months? Fill in winter with Shore A hardness 60-70.

Resealing (within 6 months of construction):

• Reseal only if joints show signs of deterioration.

Construction joints (within 12 months of deployment):

• Fill with Shore A hardness 40.

• Older than 12 months? Fill in winter with Shore A hardness 60-80.
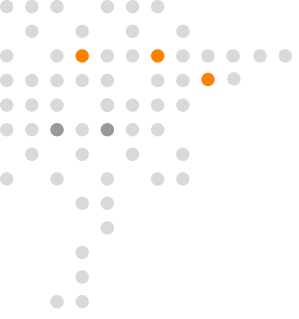
Resealing construction joints (within 6 months of construction):

• Reseal only if joints show signs of arris deterioration.

Old joints (over 12 months and >10 mm):

• Seal with a joint sealant of Shore A hardness 60-80.

Warehouse roof and walls:

• Protect against liquid spillage and dust.
• Ensure there is no seepage or leakage from the roof.
• Prevent condensation.

Protection from rodents and birds:

• Safeguard against rodents and bird droppings.
• Prevent potential damage to infrastructure and equipment.

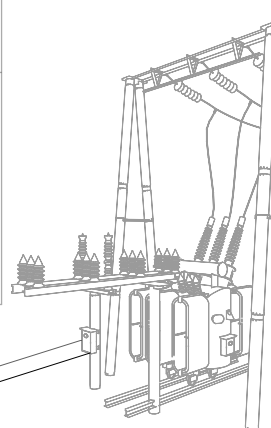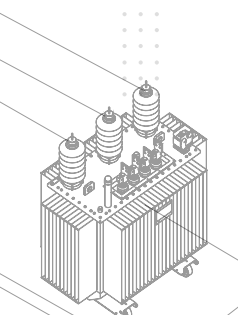## Dedicated monitoring and service room for the GreyOrange team:

• Adjacent to the bot-operational area.
• Defined size and utilities as per the GreyOrange Solutions
  Team's site layout.
• Air-conditioned with a comfortable room temperature.
• Optimum seating capacity, desks and Wi-Fi connectivity.
• Dedicated GreyOrange team to monitor operations and
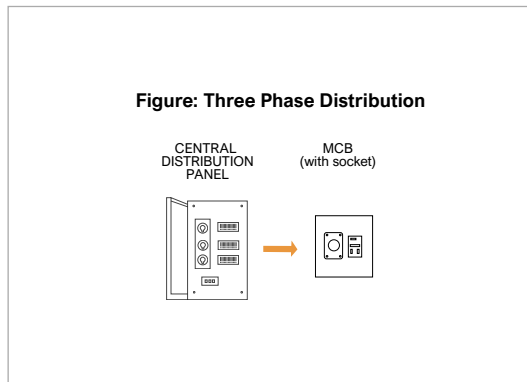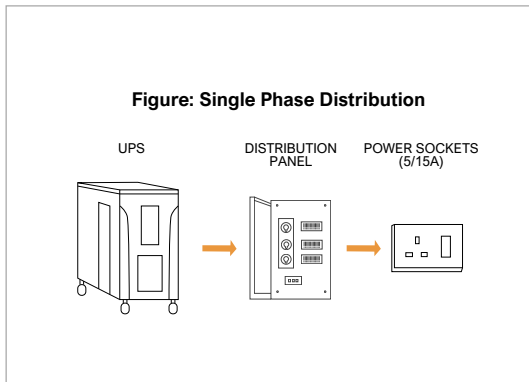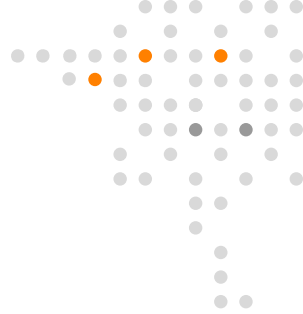 perform tests or repairs on the spot, if required.
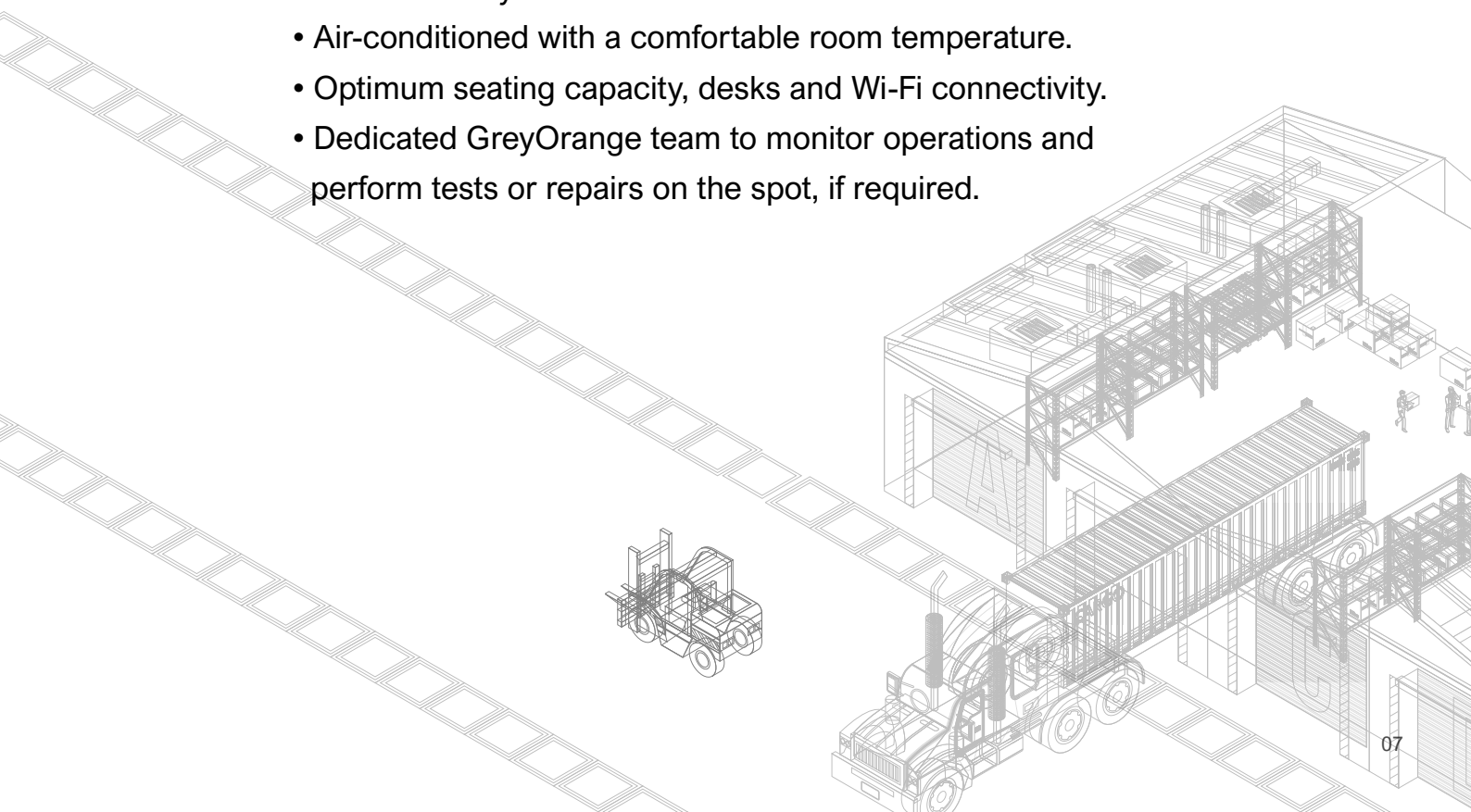
III. Electrical Infrastructure Setup

An efficient power supply is critical for the Ranger system's functionality. Explore the guidelines for Single and Three Phase power setups, covering distribution channels, socket locations, UPS necessity and cable management. Your understanding of these specifications will ensure a reliable power infrastructure for optimal Ranger performance.

Power Supply Specifications	Single Phase (230/110V AC, 50/60Hz)	Three Phase (200-400/415/480V AC, 50/60Hz)
Distribution Channel	UPS	Central Distribution Panel to MCB with Industrial Socket
Raw Power Path	UPS to Distribution Board to Power Sockets	Directly to MCB with Industrial Socket
Location of Power Sockets	Near Pick-Put Station (PPS)	Near Ranger bot Chargers
Importance of UPS	Prevents operational malfunctions during power outages	Not required due to system redundancy for power outage management
Customer Responsibility	Facilitate drop points for UPS and raw power supply	N/A

Figure: Single Phase Distribution

UPS   DISTRIBUTION PANEL   POWER SOCKETS (5/15A)

Figure: Three Phase Distribution

CENTRAL DISTRIBUTION PANEL   MCB (with socket)

Note: The system's electrical and electronic circuitry needs to be adequately earthed to prevent damage to the equipment and shock to the operator. A minimum of two separate earthing pits (i.e., one for electrical and another for electronic earthing) should be made available.

Transformer

Lightning Rod

Service Wire

Ground Wire

Electrical earthing

Electronic earthing
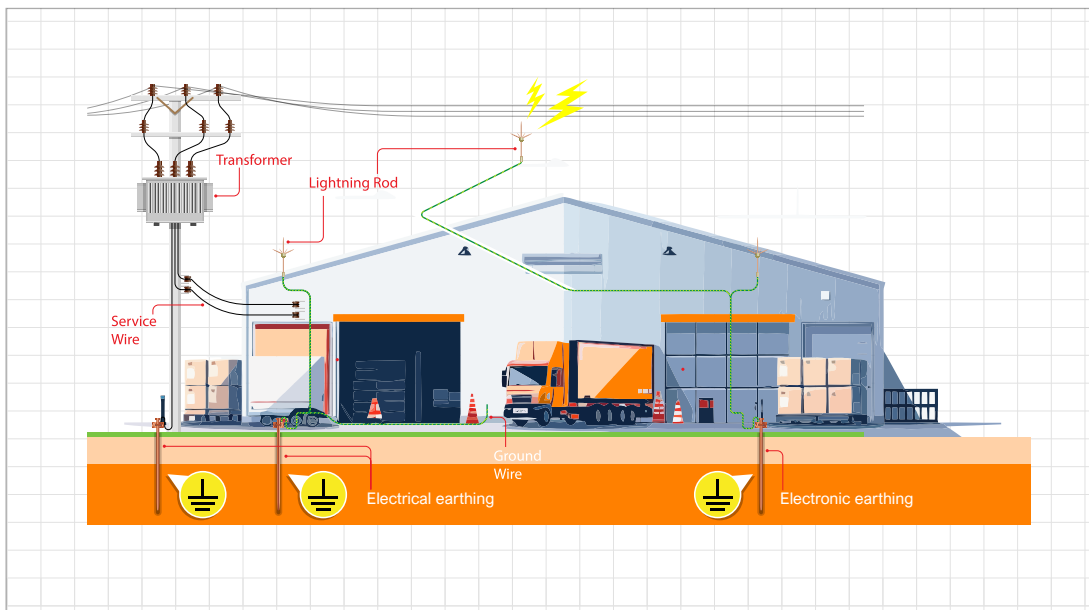
IV. The 'IT' Factor: Network Infrastructure

The 'IT' Factor delves into the pivotal realm of network infrastructure, which is a critical component for ensuring seamless Ranger operations. From LAN wiring recommendations to internet access necessities and SSH protocols, this section offers insights to optimize your IT setup for peak performance, security and reliability.

LAN wiring:

- Role: Connects servers to Ranger equipment (Auto-Charging Station, PPS, Wi-Fi access points).
- Recommendation: Cat 6 UTP wires with RJ45 plugs for reliable and fast communication.
- Length restriction: 60 m (196.85 ft) for 10/100 Ethernet port.
- Beyond 60 m: Install a field rack near the Ranger area and use an optical fiber cable to connect to the server room.

Internet access:

Required for system monitoring, off-site server access (WWW or VPN), troubleshooting and code deployments.

Secure Shell (SSH):

- Function: Cryptographic network protocol for secure remote login and network services.
- Use: Allows GreyOrange to access customer servers securely for maintenance and updates.

Layout considerations:

Cable gap: Maintain a minimum 300 mm (11.81 in) gap between power and network cables to prevent electrical noise interference.
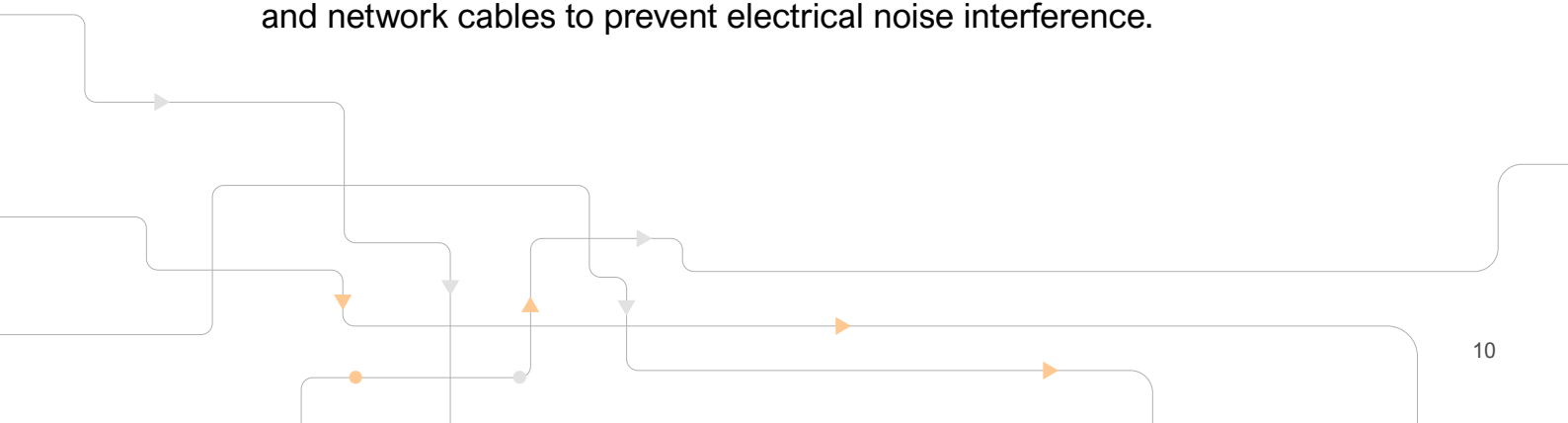
Improving Wi-Fi network

If your Wi-Fi network falls short, enhancing coverage is crucial. Consult a Wi-Fi expert for personalized solutions. Consider the following to boost Wi-Fi coverage:

Optimal channel usage:

- Use more channels to allow for greater distance between coverage areas.

- This enhances signal strength, reduces interference and improves signal-to-noise ratio for higher data rates.

Minimizing interference:

- Arrange and configure access points strategically.

- Mitigate interference by optimizing access point placement and settings.

- Prioritize minimizing interference from other Wi-Fi signals over general radio frequency disruptions.

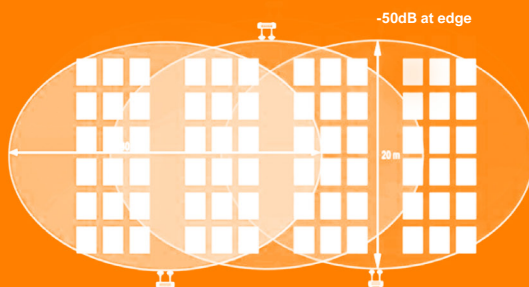Figure: Wi-Fi Signal Mapping (Top View)

-50dB at edge

20 m

Figure: Wi-Fi Signal Mapping (Front View)

200 mm

Mastering site preparedness is the key to unlocking the full potential of GreyOrange's Ranger system. Get in touch with our team today to find out more about how you can make your site robot-ready.