Locus Route Constraints Guide

Deliver Smarter, Operate Leaner With Locus

Introduction: Turning Constraints Into Smarter Logistics Decisions

In logistics, optimization isn't just about finding the fastest or shortest route. It's about finding the best route, one that works within the real-world constraints of your operations.

Constraints, like vehicle capacity, driver hours, and road restrictions are key enablers that turn theoretical routing into actionable, profitable outcomes.

Without constraints, routes miss critical factors such as:

- Vehicle capacity (how much weight or volume can be carried)

- Driver availability and work regulations

- Customer SLAs and time-sensitive delivery windows

> *Constraints are the "guardrails" that turn ideal routes into achievable routes.*
> *They bridge the gap between mathematical optimization and real-world delivery excellence.*

At Locus, constraints are built into the core of our Fireworks routing engine, ensuring smart routing that works in the real world, helping businesses optimize performance, costs, and efficiency.

Locus

Why Constraints Are The Secret To Smarter Route Planning

Optimization Without Constraints
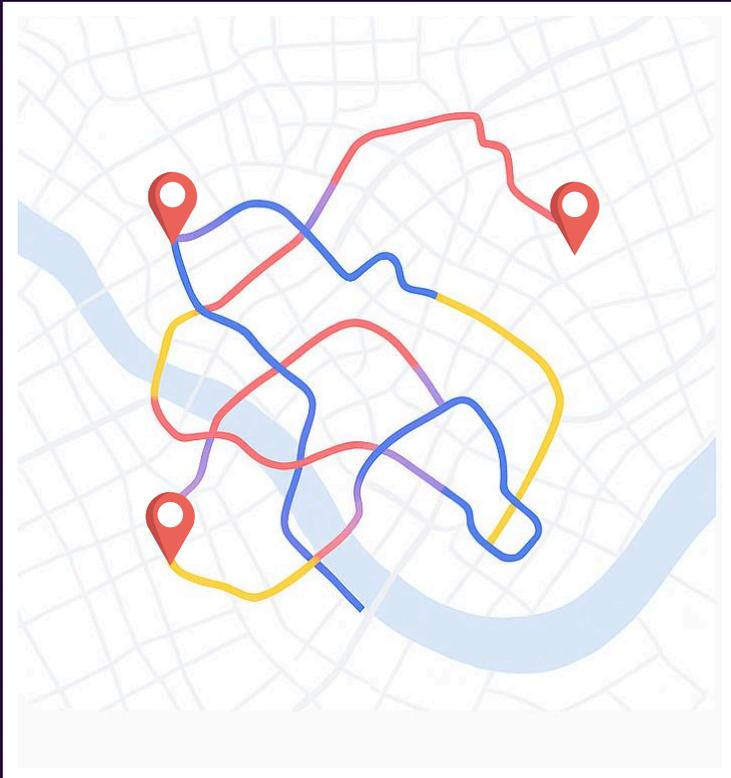
Optimization With Constraints
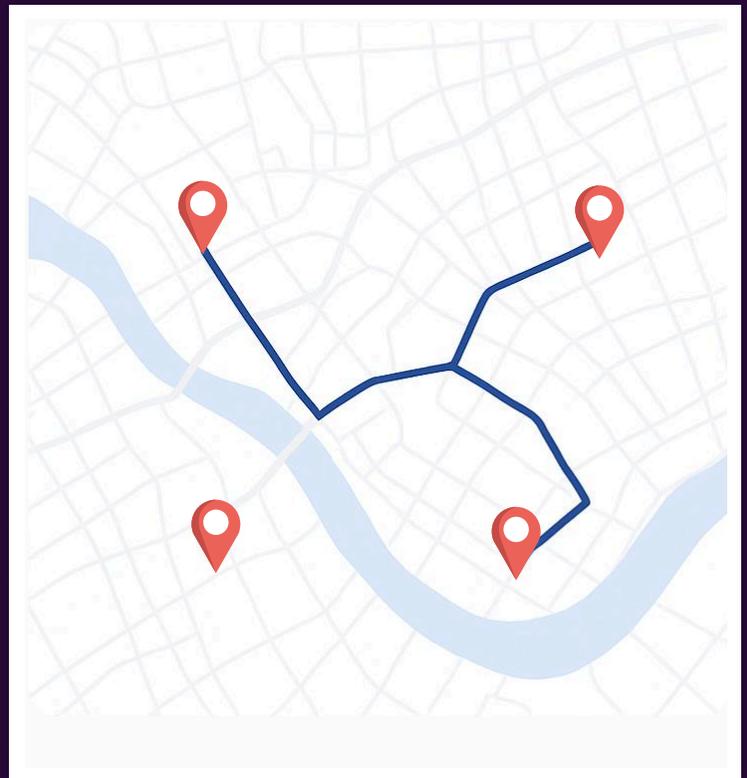
Constraints are non-negotiable when it comes to optimizing logistics. They are what make route planning realistic and actionable. Without them, logistics decisions are based on theory, not reality.

Locus uses over 250 real-world constraints, tailored to your unique business needs. These constraints aren't just about staying compliant, they are the levers that allow us to:

- Maximize vehicle utilization
- Lower operational costs
- Ensure on-time deliveries, even when conditions change

This approach allows for scalable, flexible fulfillment that can adapt to changing business needs, while keeping performance on track.

Tailor Routing Strategies To Your Delivery Models

Every business model defines how goods move:

- Where items are picked up from
- How they are routed
- Where they are dropped off

Each delivery model brings its own movement patterns and operational challenges:

- How many stops a vehicle makes
- Whether you prioritize speed, cost, or SLA adherence
- Which constraints, vehicle, driver, time, or road, become most critical

Business Models in Modern Logistics

Hub And Spoke Delivery

Central warehouse → Multiple customer destinations

Maximize delivery density and minimize warehouse touchpoints.

Supplier Consolidation

Multiple suppliers → Single drop-off point

Streamline inbound logistics and reduce collection costs.

Forward + Reverse Logistics

Deliver products → Collect returns or pickups on the same route

Improve vehicle utilization and cut return costs..

Van Sales/Network-Based Routing

Multiple pickups + Multiple drop off points

Consolidate mid-mile and optimize delivery networks.

Multiple-Trip Routing

Same vehicle does multiple trips from hub within a shift

Maximize vehicle usage during working hours.

The Right Constraints

=

Higher Efficiency For Your Specific Business Model.

Improve Routing Decisions With The Right Constraints

Every business faces unique challenges. The key to operational success isn't just about picking the right delivery model, it's about applying the right constraints to each model to drive the most efficient, cost-effective, and customer-focused routing.

Let's break down the core constraint categories that drive smarter, faster, and more resilient logistics operations with Locus.

Fleet Constraints

Fleet constraints ensure that your vehicles are operating at peak efficiency, considering:
- Capacity limits (weight, volume, payload)
- Speed limits
- Skills matching for specific orders (e.g., frozen, fragile items)

These constraints ensure that every vehicle is used efficiently, adhering to legal limits and ensuring operational balance.

Vehicle Capacity: Limits on weight, volume, and payload

Dimensional Constraints: Order size restrictions based on vehicle dimensions.

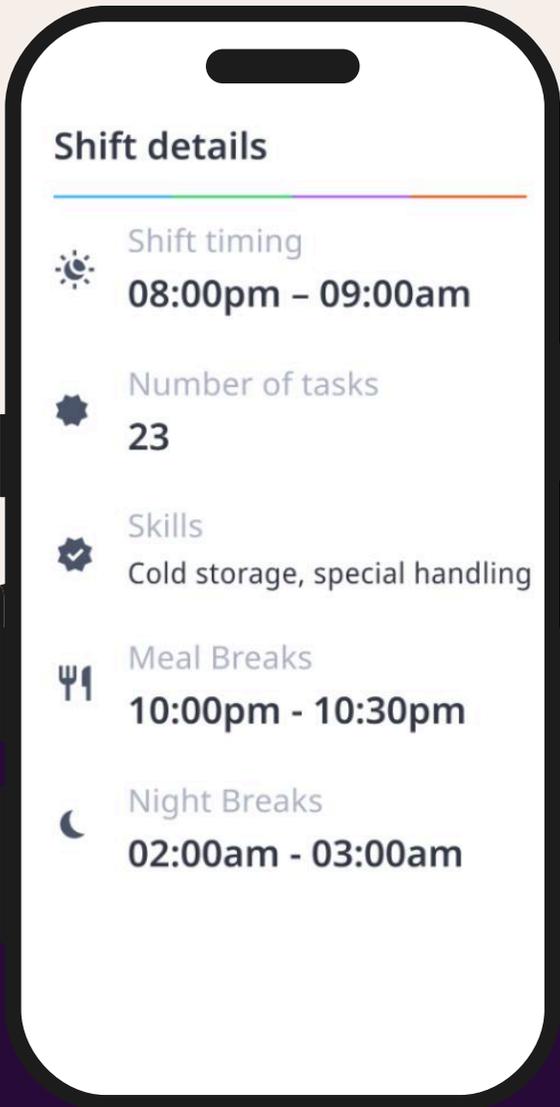**Overloading Limits:** Legal and operational weight limits

Operating Hours and Business Unit: Maximum utilization per vehicle and service zone

Speed Limits: Speed restrictions based on vehicle type and service area

Skills Matching: Aligning vehicles with order types

Shift details

Shift timing
08:00pm – 09:00am

Number of tasks
23

Skills
Cold storage, special handling

Meal Breaks
10:00pm - 10:30pm

Night Breaks
02:00am - 03:00am

Driver Constraints

Managing driver constraints ensures that your team is working effectively and safely. These include:

- Hours of Service (HOS) limits
- Break management (e.g., lunch, refuel, and night breaks)
- Distance/time limits for safe driving

These constraints ensure your drivers are productive and safe, helping you meet delivery deadlines without overloading your team.

Driver Availability: Scheduling shifts and availability for each driver

Shift Management: Number of shifts assigned to a driver

Hours of Service Limits: Legal restrictions on how long drivers can work

Travel Time Limits: Restrictions on how long a driver can drive continuously

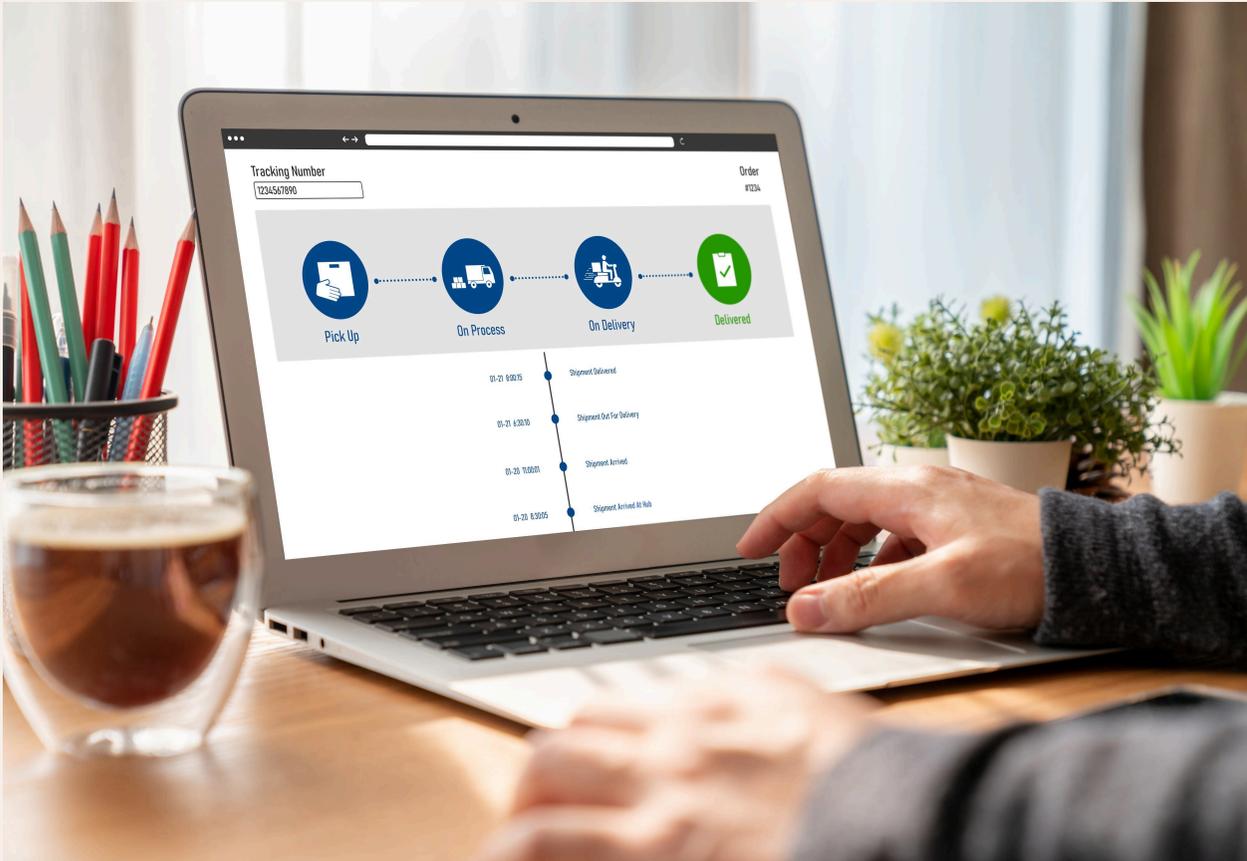**Distance Limits:** Maximum distance drivers are allowed to travel

Business Unit Assignment: Linking drivers to specific business units and service areas

Breaks Management: Managing rest periods, including lunch, refuel, night breaks, and off-duty time

Delivery Time Constraints

Delivery time constraints make sure deliveries are completed on time and within customer-defined windows. They focus on:

Service Windows: Defining the acceptable time frame for delivery

Tardiness Management: Adjusting routes to avoid delays and ensure on-time delivery

SLA Compliance: Ensuring the service level agreements (SLAs) are met consistently

These constraints ensure on-time deliveries, directly maximizing customer satisfaction by meeting delivery promises.

Road and Traffic Constraints

Road constraints help avoid restricted zones, traffic congestion, and roadblocks while optimizing routes for real-world conditions.

Regional Dividers

Delivery grouping on both sides of a road divider, applicable in case of a highway, waterbody, one-way, etc. to limit the vehicle from delivering on either sides of the divide

Area Restriction

Limit vehicle entry to specific areas based on traffic conditions and urban access regulations
Example:
- Time Slots: 4:00PM - 6:00PM
- Traffic Density: Modify Vehicle Travel Time in these areas

Road Restriction

Inaccessible roads due to road block restrictions or off-limit routes
Example :
- One Ways: Unidirectional roads
- No-Stopping Zones: Continuous vehicle movement with no stops or parking
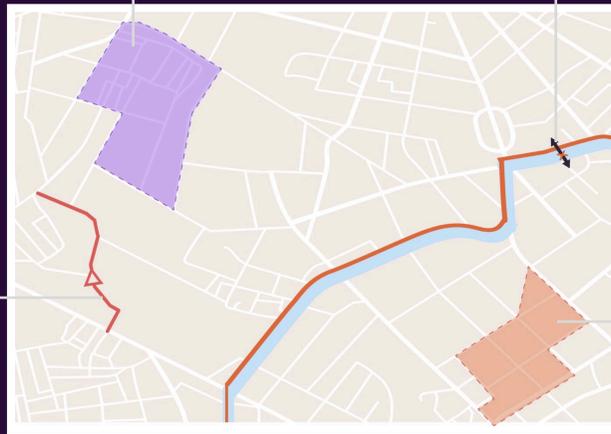
Restriction Scope

- Vehicle Type: Truck, Bike
- Vehicle Model: Mercedes Actros, Volvo FM 400, Ford Transit
- Vehicles Registration Number against day of the week

Accounting for these obstacles ensures routes are feasible, reliable, and efficient, leading to accurate delivery times and more dependable routes.

Locus Constraints Drive Smarter, More Efficient Routing

The constraints outlined above are the most critical levers in the entire routing process—the foundation of real-world logistics optimization. Failure to manage these constraints effectively can derail cost-efficiency, service levels, and overall operational performance.

For retailers, Locus constraints are the difference between operational excellence and costly inefficiencies, making them a key driver in improving your logistics performance and customer experience.

Align Your Fulfillment Operations With Business Priorities

Routing objectives are how you turn the constraints into actionable goals that are aligned with your business needs. These objectives allow you to make strategic decisions that optimize logistics while balancing speed, cost, and service levels.
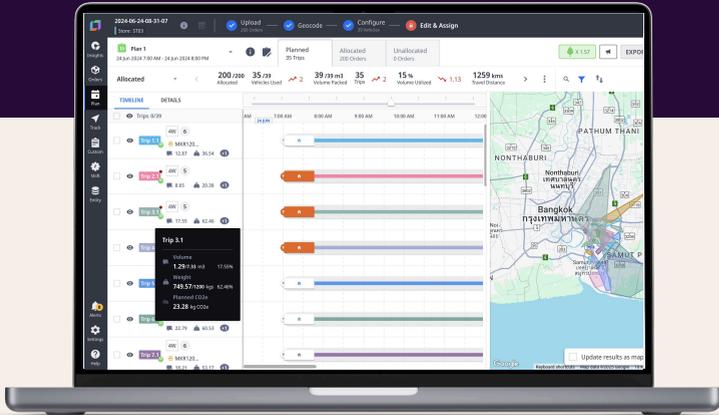
Fleet Optimization

Fleet optimization ensures that every vehicle in your fleet is used to its full potential while minimizing costs. This allows for better fleet management without the need for extra vehicles.
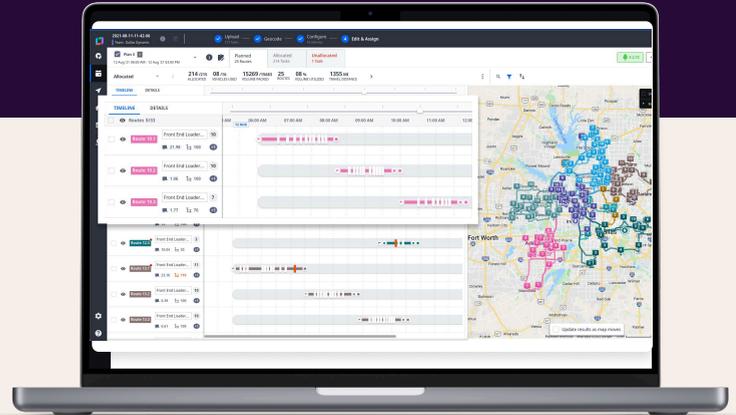
Faster Execution with Suboptimal Results

When deadlines are tight, this objective focuses on speed over route perfection. It ensures that deliveries are made on time, even if minor inefficiencies arise in the process.
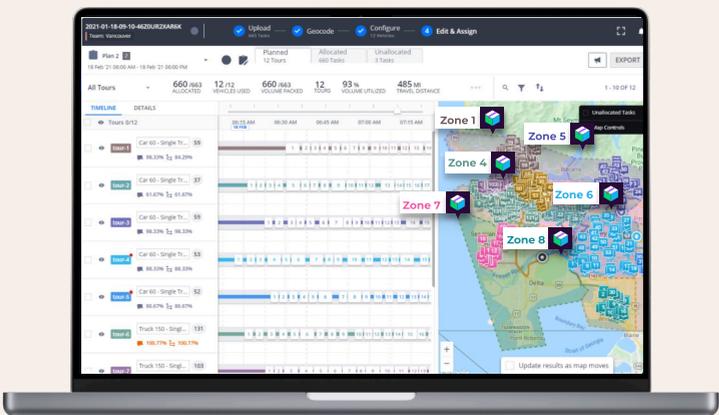
Zone-Based Routing

Zone-based routing helps optimize deliveries within specific regions, reducing travel time and maximizing vehicle usage in each geographic zone.
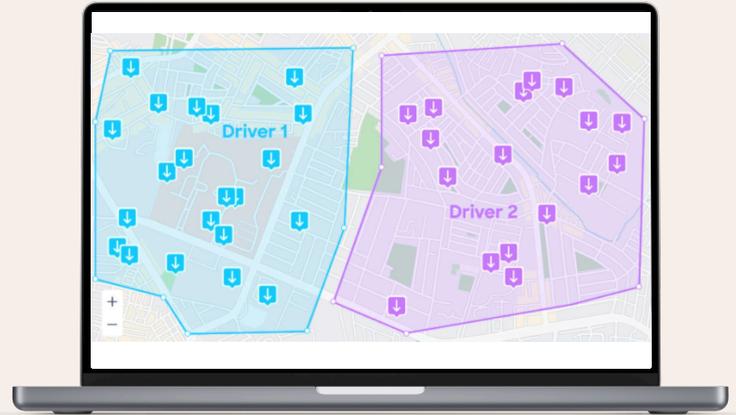
Dynamic Planning

Dynamic planning enables real-time adjustments based on changing conditions like traffic or weather, ensuring on-time deliveries despite disruptions.
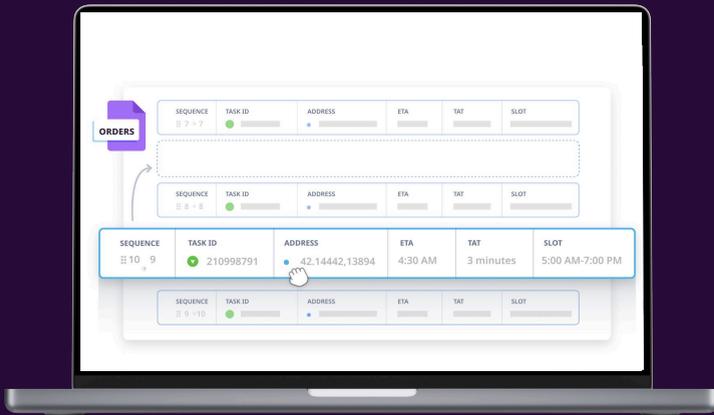
Order Sequencing

Sequencing helps determine the most efficient order for deliveries, balancing priorities like customer needs and shortest distance/time.
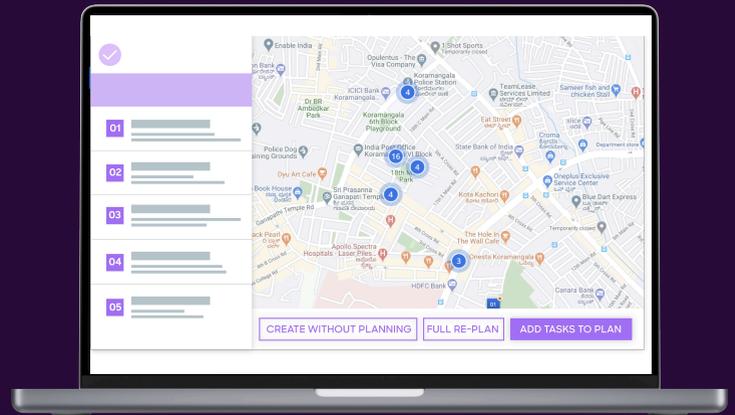
Incremental Planning

Incremental planning allows for quick integration of last-minute orders, adapting routes dynamically without affecting existing schedules.

Locus Adapts Routes To Fit Your Unique Business Challenges

Routing objectives are where strategy meets execution. They allow you to tailor logistics operations to fit your fulfillment needs and business priorities, whether you're focused on cost reduction, faster deliveries, or customer satisfaction. By aligning these objectives with real-time constraints, Locus empowers retailers to drive revenue growth, optimize resources, and maintain operational control—all while meeting business-specific goals.

Implement Flexible Solutions For Real-World Challenges

While core constraints provide the backbone for operational efficiency, soft constraints help balance operational needs with real-time demands, ensuring that your logistics system remains agile in the face of change.

Fairness

Fairness ensures that workloads are evenly distributed among drivers, avoiding burnout and ensuring operational balance.

Tardiness

Tardiness constraints provide flexibility in delivery times, allowing for reasonable delays without breaching SLAs..

Order Grouping

Order grouping focuses on grouping deliveries by location, time, or task to reduce the number of stops and ensure efficient task execution.

Transaction Time Grouping

TAT grouping prioritizes deliveries based on turnaround time, ensuring quick completions and optimized scheduling.

Locus Delivers Agility And Efficiency With Each Route

In the dynamic world of retail logistics, soft constraints ensure that you can meet shifting priorities without compromising on service quality. These constraints are critical for keeping pace with unexpected changes, whether it's an increase in demand, unforeseen delays, or last-minute orders.

For retailers, soft constraints are a key lever to remain competitive and responsive, ensuring that logistics operations stay efficient, sustainable, and cost-effective.

See How Locus Constraints Drive Impact

Real Results. Real Savings. Measurable Across Industries

Locus has helped businesses across industries—from retail to CPG to food distribution—achieve tangible improvements in their logistics operations. Whether it's reducing fleet costs, improving on-time delivery rates, or cutting fuel costs, the impact is clear:

34%
reduction in planning time

80%
vehicle space utilization

85%
increase in last-mile productivity

24%
reduction in transportation costs

12%
reduction in logistics costs

20%
increase in driver productivity

99.5%
SLA adherence for industry leading customer service

100%
on-time delivery rate with increased routing efficiency

These outcomes are not just statistics, they're proof of how Locus' routing solutions can unlock significant value in enterprise-level logistics operations.

Locus' constraint-driven routing adapts to your unique logistics needs, offering customizable constraints that align with your specific goals. By integrating our solutions, we help you drive agility, cost efficiency, and customer satisfaction.

Whether optimizing fleet use or managing dynamic delivery networks, Locus empowers businesses to tailor solutions that fit their operations, ensuring future-ready logistics.

Brands We Empower

Unilever · Nestlé · JAPFA · Avian BRANDS · FKS Food · SOHO Global Health · PHILIP MORRIS INTERNATIONAL

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Achieve Smarter Logistics. Powered by Locus

By applying the right constraints and routing objectives, Locus enables businesses to achieve smarter logistics, reduce costs, and improve customer satisfaction.

Imagine the impact of measurable cost reductions and optimized operations that come with Locus' routing constraints. These constraints don't just improve routes, they transform your entire logistics strategy.

Ready to transform your logistics operations?
Start optimizing today with Locus constraints to maximize efficiency, cut costs, and stay ahead of the competition.