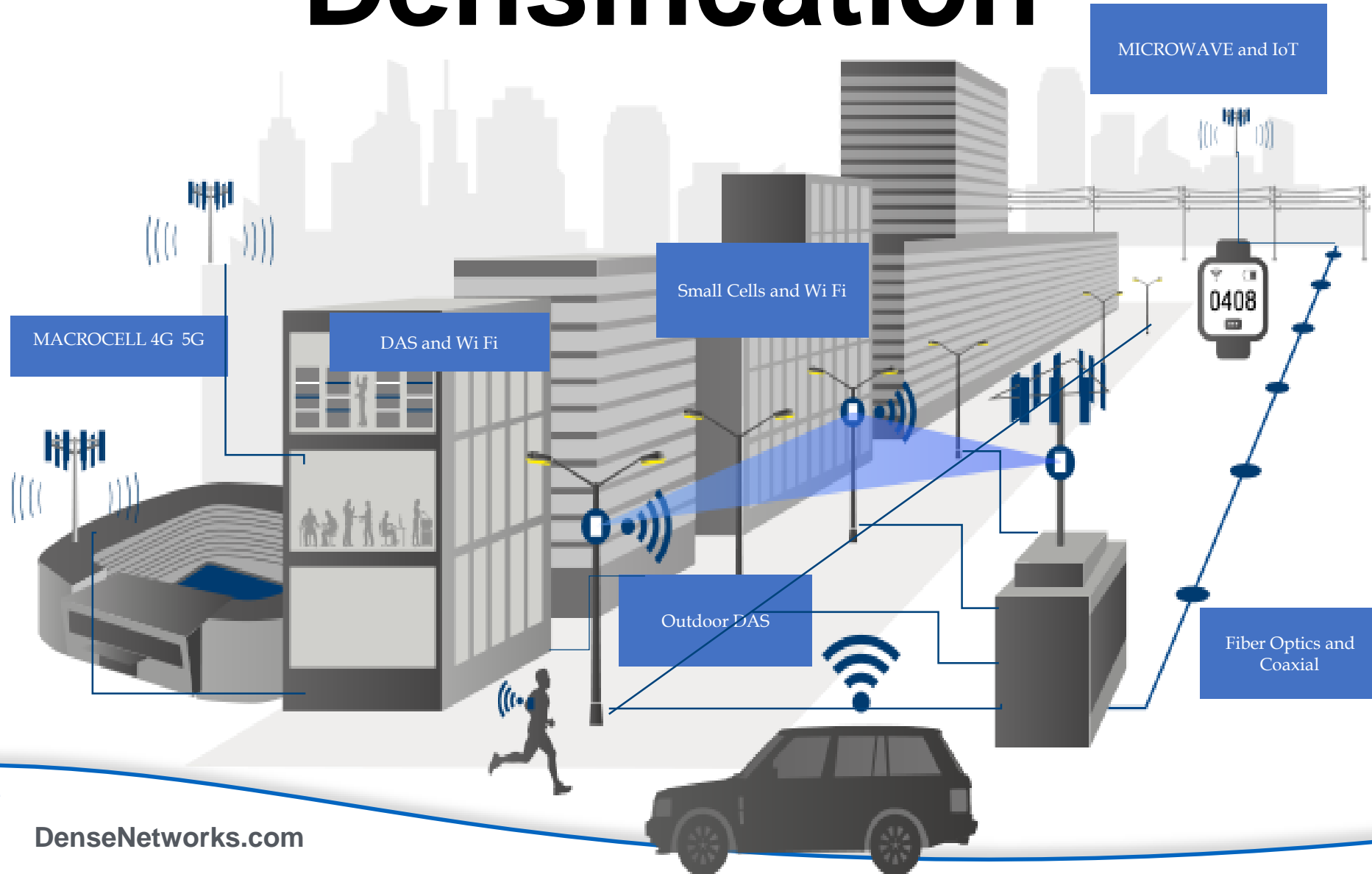


Densification



Capacity

Coverage



Bandwidth

ENTER

[click here for more information](#)

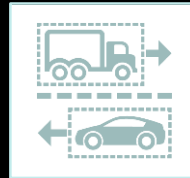
Hitachi Video Analytics Delivers Digital Insights

NEXT
2018

Operational & Business Intelligence



People Counter



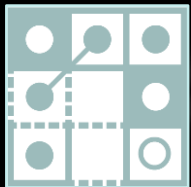
Traffic Analyzer



Queue Detector



License Plate Recognizer



Activity Visualizer



Parking Space Analyzer



Direction Controller



Camera Health Monitor

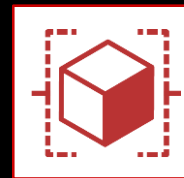
Security



Intrusion Detector



Facial Recognition



Object Detector



Video Enhancer

Privacy



Privacy Protector



European Privacy Seal
EP-P-F9LDTM / Valid till 2017-10

Police • Hospitals • Campuses • City Agencies • Retail • Financial Services • Transportation • Utilities

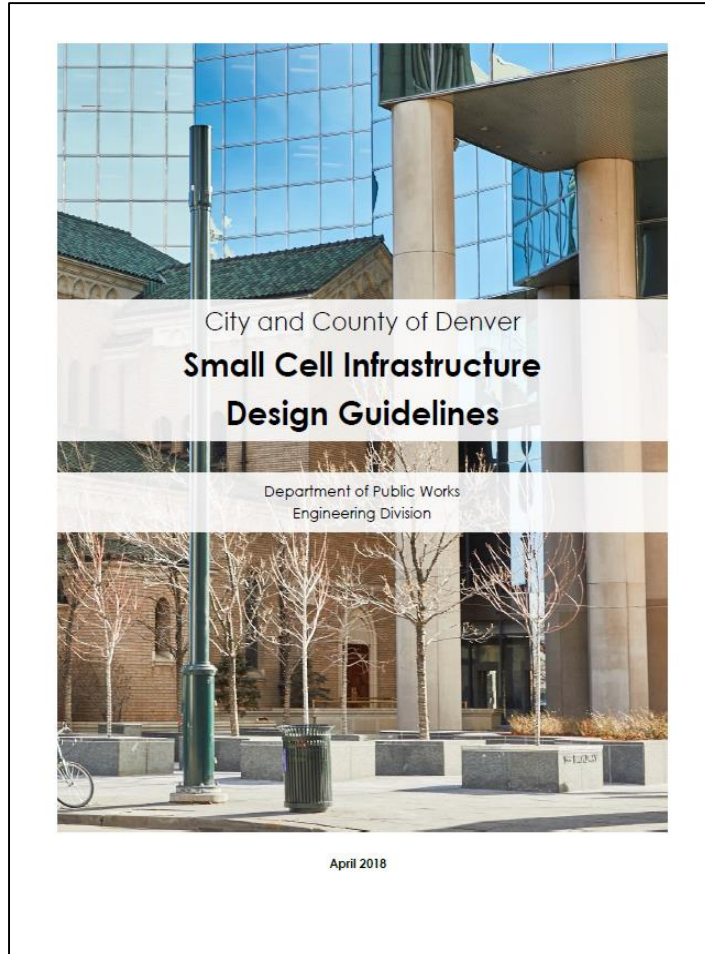
Smart Mobility **PLAN INTEGRATION**



Smart Cities

**Transportation
element of Bellevue
Smart**

Public Works has created Design Guidelines and a custom Permit process to address:



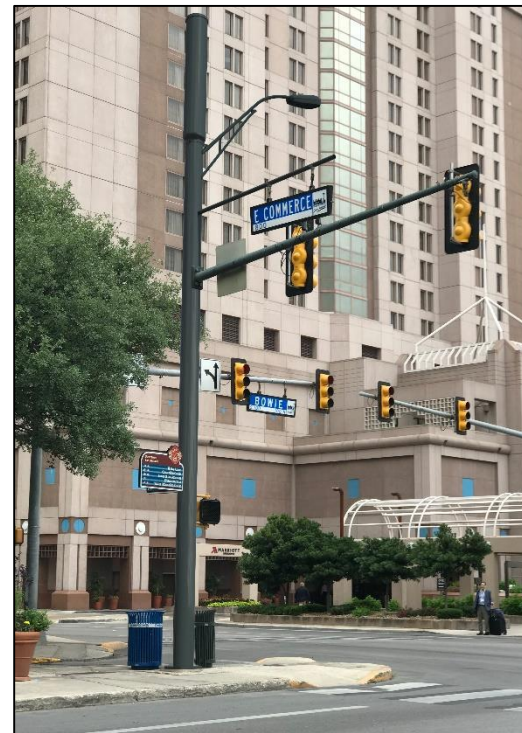
- ❑ Public-facing review process including Districts, City Departments, Neighborhood Orgs
- ❑ Policy for co-location first
- ❑ Notification of adjacent property owner
- ❑ Restricting new pole density through min 250' spacing
- ❑ Restricting placement (along parks, historic & residential frontages)
- ❑ Restricting placement in front of residential & valuable sight lines
- ❑ Requiring camouflage and concealment
- ❑ Limiting height and equipment size
- ❑ Opportunity to coordinate fiber conduit

 DENVER THE MILE HIGH CITY The City and County of Denver Public Works Department Jon Reynolds, Engineering Supervisor	 JACOBS Jacobs Engineering Group Mike Butters, Project Manger
 CLANTON & ASSOCIATES LIGHTING DESIGN AND ENGINEERING Clanton & Associates: Nancy Clanton, CEO Dane Sanders, Principal Annie Kuczkowski, Engineer II - Lighting	 Aero Wireless Group Aero Wireless Group: Jim Lockwood, CEO Mike Hoganson, Chief Operating Officer

Traffic Signal: Before vs. After

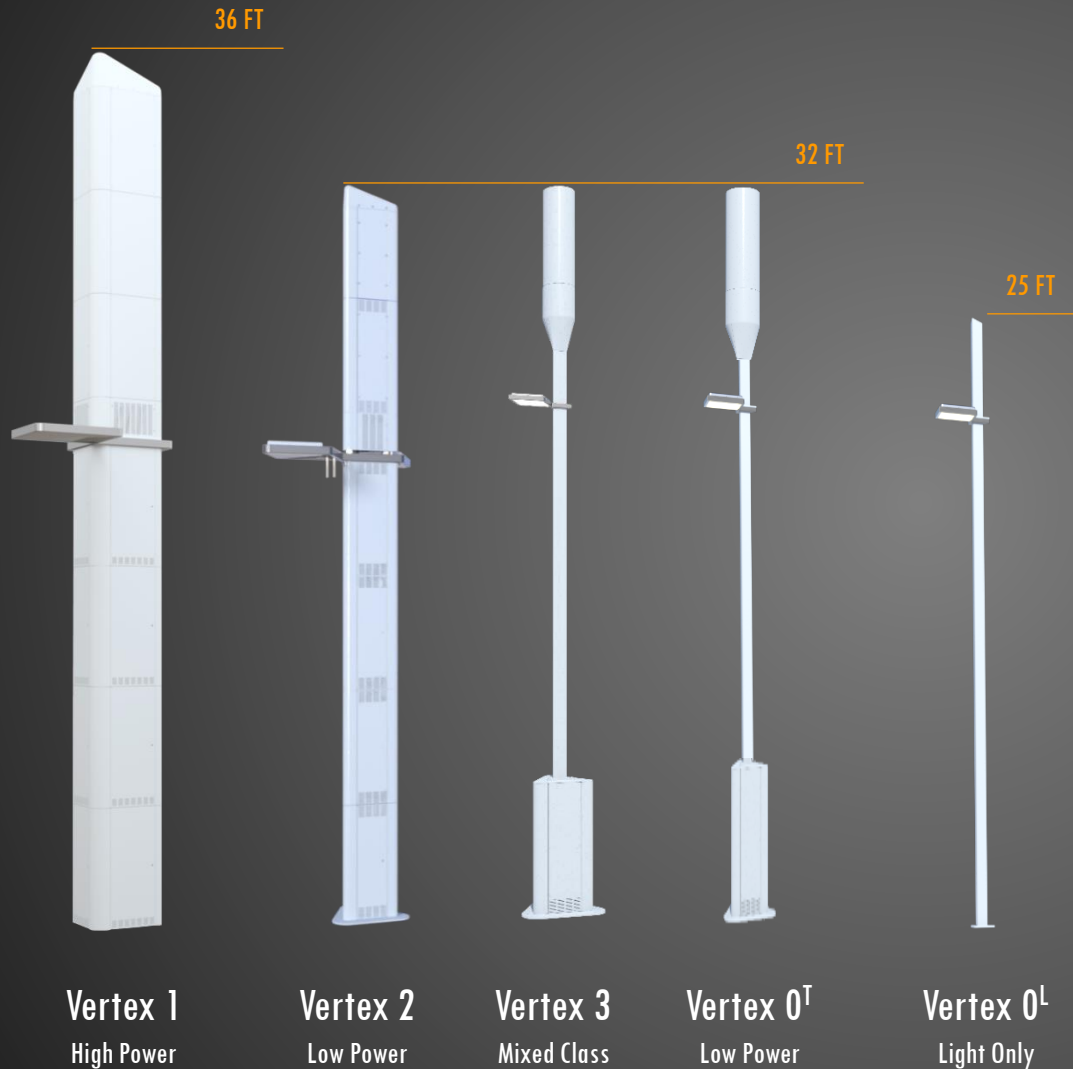


Existing – Before



New – After

Our Portfolio of Telecommunication Infrastructure



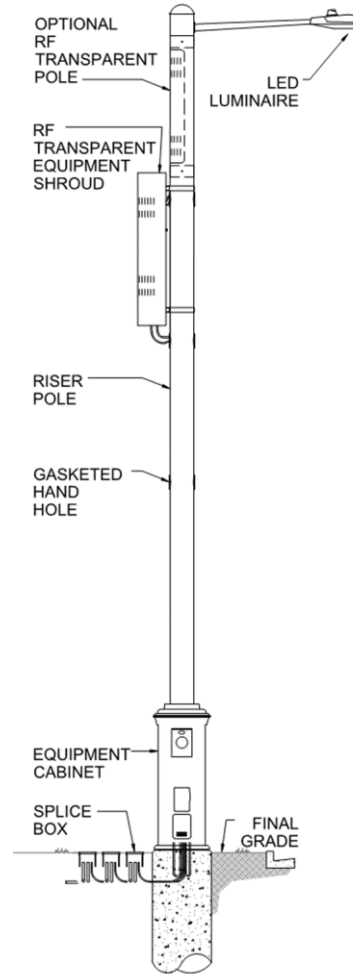
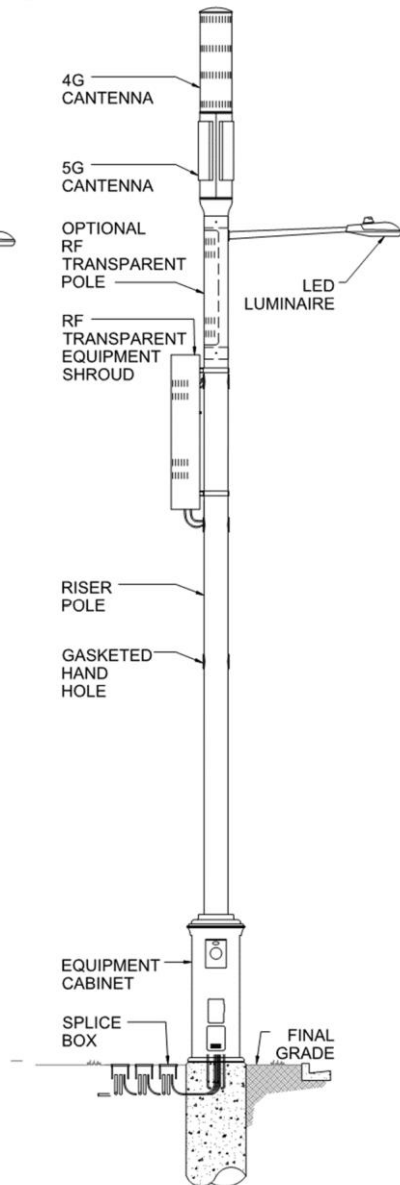
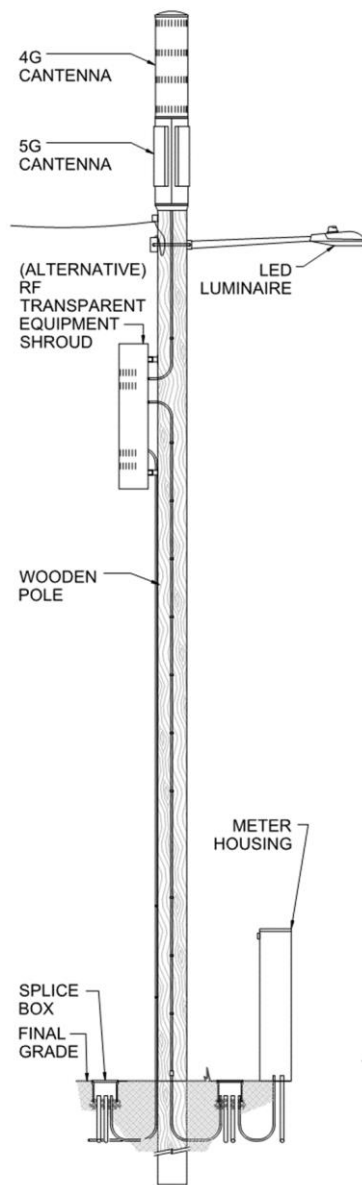
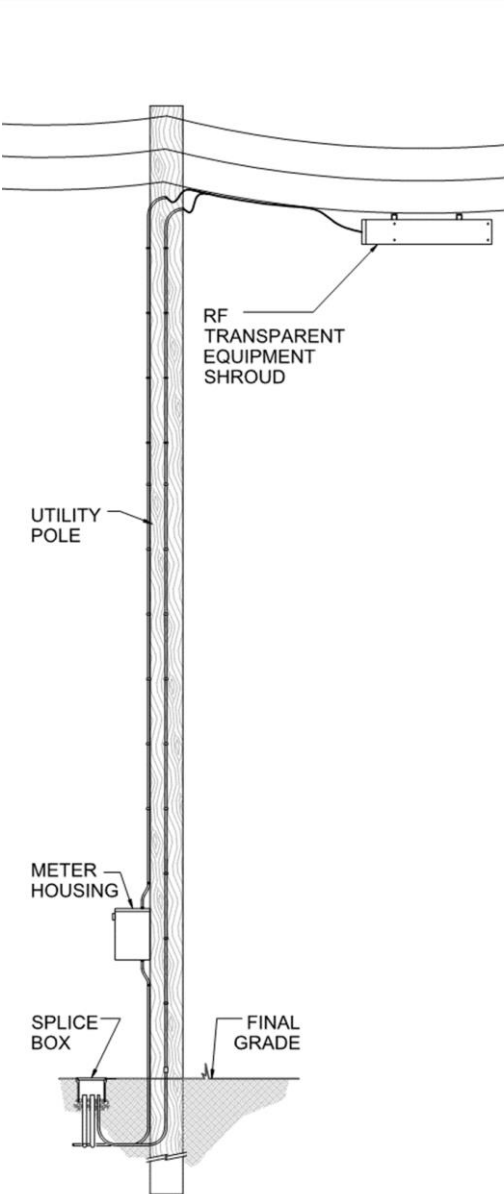
INTEGRATED POLE SPECIFICATIONS

- Radio Vendor Neutral
- ASHTO Light Standard Compliant ASCE 7-93
- GR487, NEMA and TIA-222 Compliant
- UL/ULC Approved Portfolio
- Vendor approved operating environment (preserving radio warranties)
- Universal foundation allowing for rapid site development/changes
- Stainless steel construction offering the longest life expectancy
- Engineered for coastal zone hurricane force winds and seismic zone 4
- Unmatched radio density across all classes of infrastructure

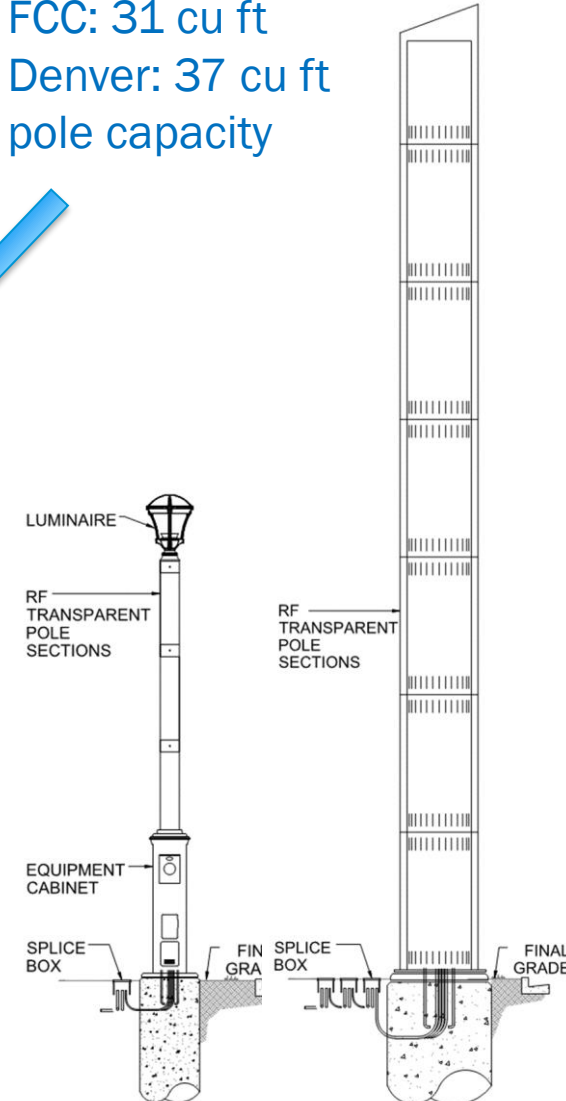


FDC — Configurable Site Cabinet

Vertex Integrated Pole Portfolio for 4G/5G



Colorado: 17 cu ft
FCC: 31 cu ft
Denver: 37 cu ft
pole capacity



Example FlexGrid Deployment



1: Radio Colocation & Core Network

Landmark deploys state-of-the-art stealth tower infrastructure that enables the deployment of 4G/5G in marquee locations typically resistant to traditional macro/micro cell towers. Landmark's offerings provide prospective tenants a neutral host solution for small cell connectivity and various smart city and IoT applications.

2: Connected Kiosk

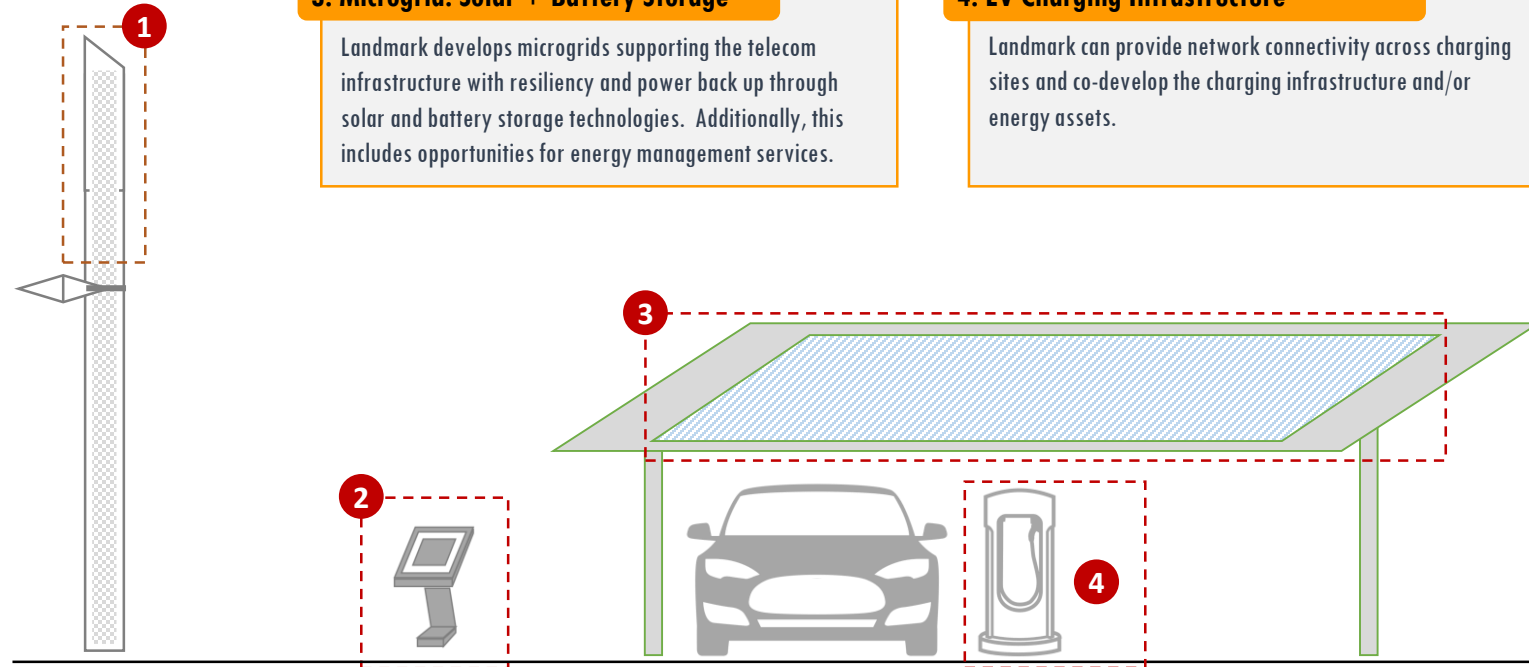
Landmark brings high-speed connectivity fostering a rich environment for out-of-home digital kiosk network operators. Kiosk networks can be leveraged for public safety announcements and advertising revenues.

3: Microgrid: Solar + Battery Storage

Landmark develops microgrids supporting the telecom infrastructure with resiliency and power back up through solar and battery storage technologies. Additionally, this includes opportunities for energy management services.

4: EV Charging Infrastructure

Landmark can provide network connectivity across charging sites and co-develop the charging infrastructure and/or energy assets.





Smart Street lighting

- **GOAL: 100% LED streetlight by 2020**
- OUC working to retrofit 20,000+ streetlights to LED
 - 12,480 currently retrofitted
- Exploring test of new “Smart Streetlights” in Downtown
 - LED technology
 - Video surveillance
 - Environmental monitoring
 - Traffic analytics
 - Wi-fi / DAS systems
 - Gun shot detection



Smart Mobility **VISION**

Use innovation and partnerships to deploy emerging technologies that enhance the safety, sustainability, efficiency, and accessibility of Bellevue's transportation system.



Looking to the Future

“We’re at the footsteps of the most transformative technology in 100 yrs”

Nvidia CEO Jensen Huang

- 82M accidents last year
- 1.3M fatalities
- \$\$Billions in Medical



Advanced Technologies & Smart Cities

Technology convergence is revolutionizing transportation, dramatically improving safety & mobility while reducing costs & environmental impacts



TRAFFIC MANAGEMENT



Autonomous

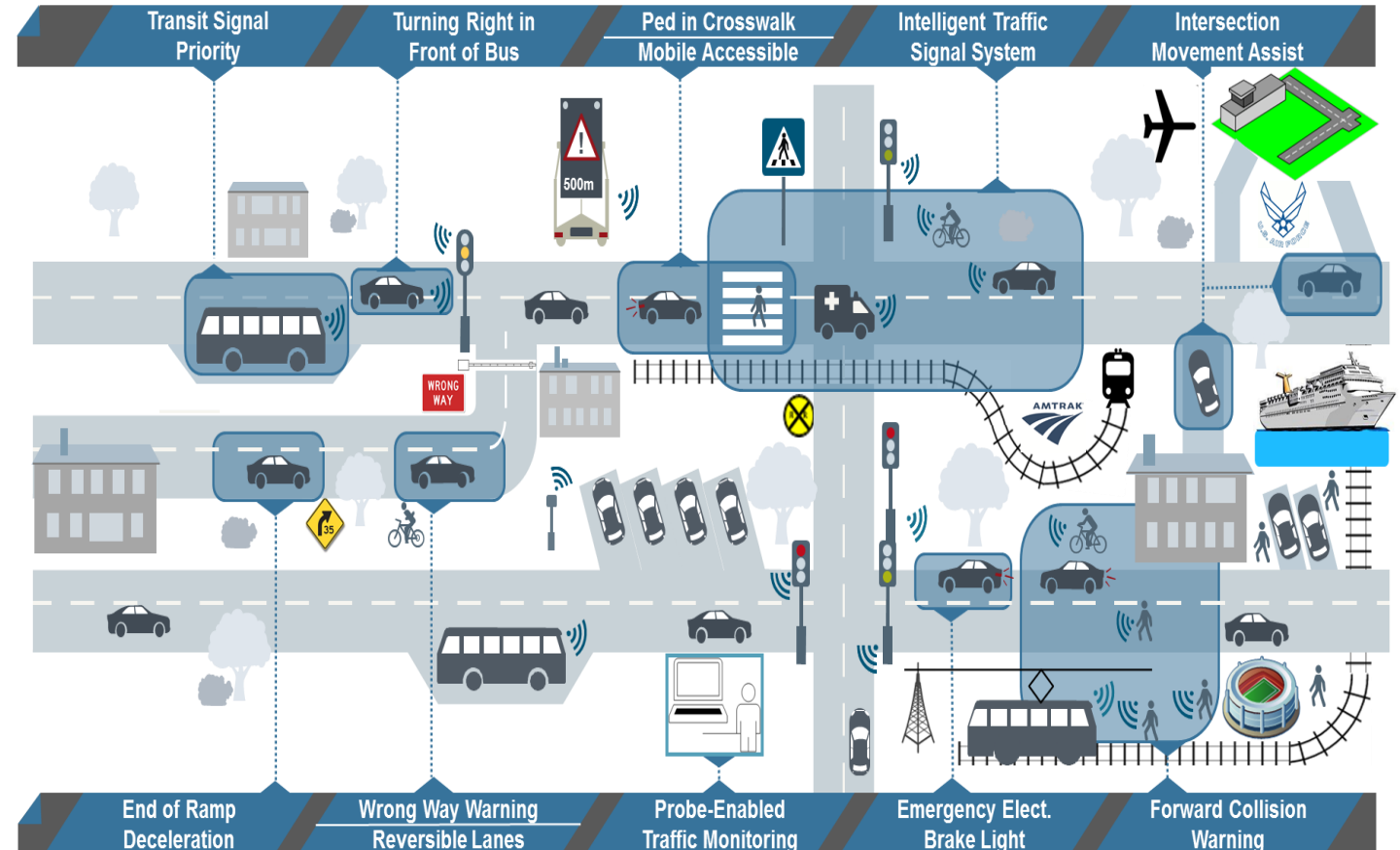


Connected

CV Pilot Overview



- Pedestrian Safety
- Traffic Management
- Transit Efficiency
- Collision Avoidance
- Wrong-Way Driver Alerts
- DSRC



PROJECTS

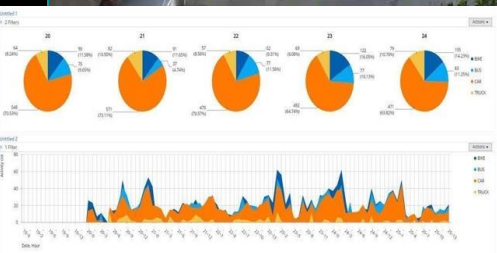
DATA MANAGEMENT



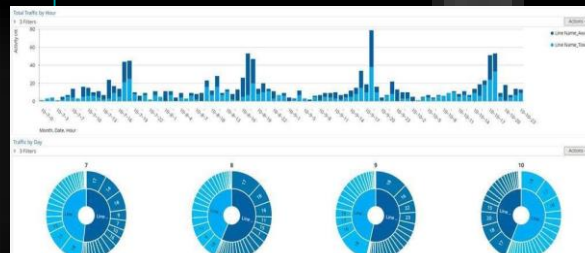
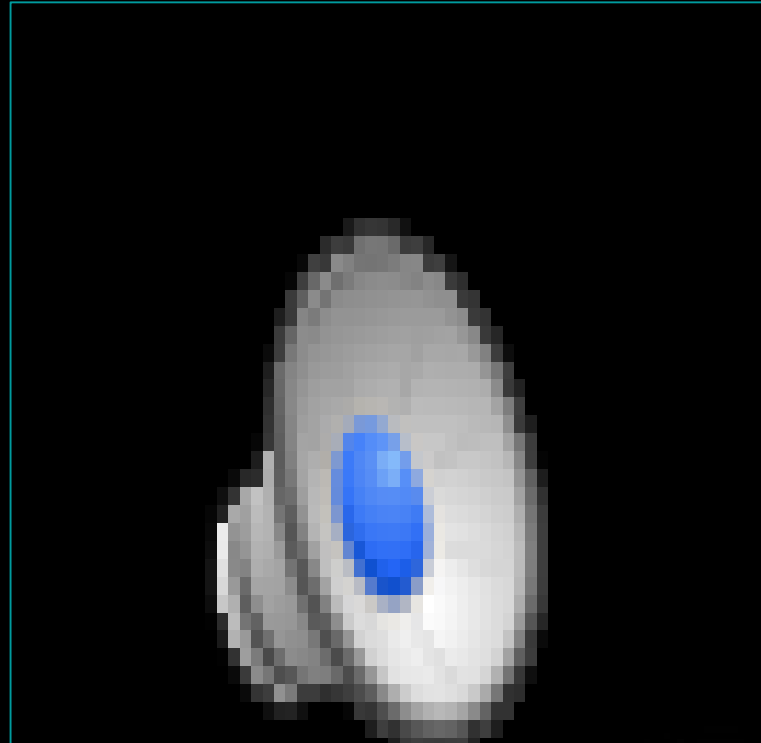
Video + AI = Rich Insights and Alerts Operations, Business and Safety Intelligence

NEXT
2018

Traffic Analysis



People Counting



Operations and Privacy



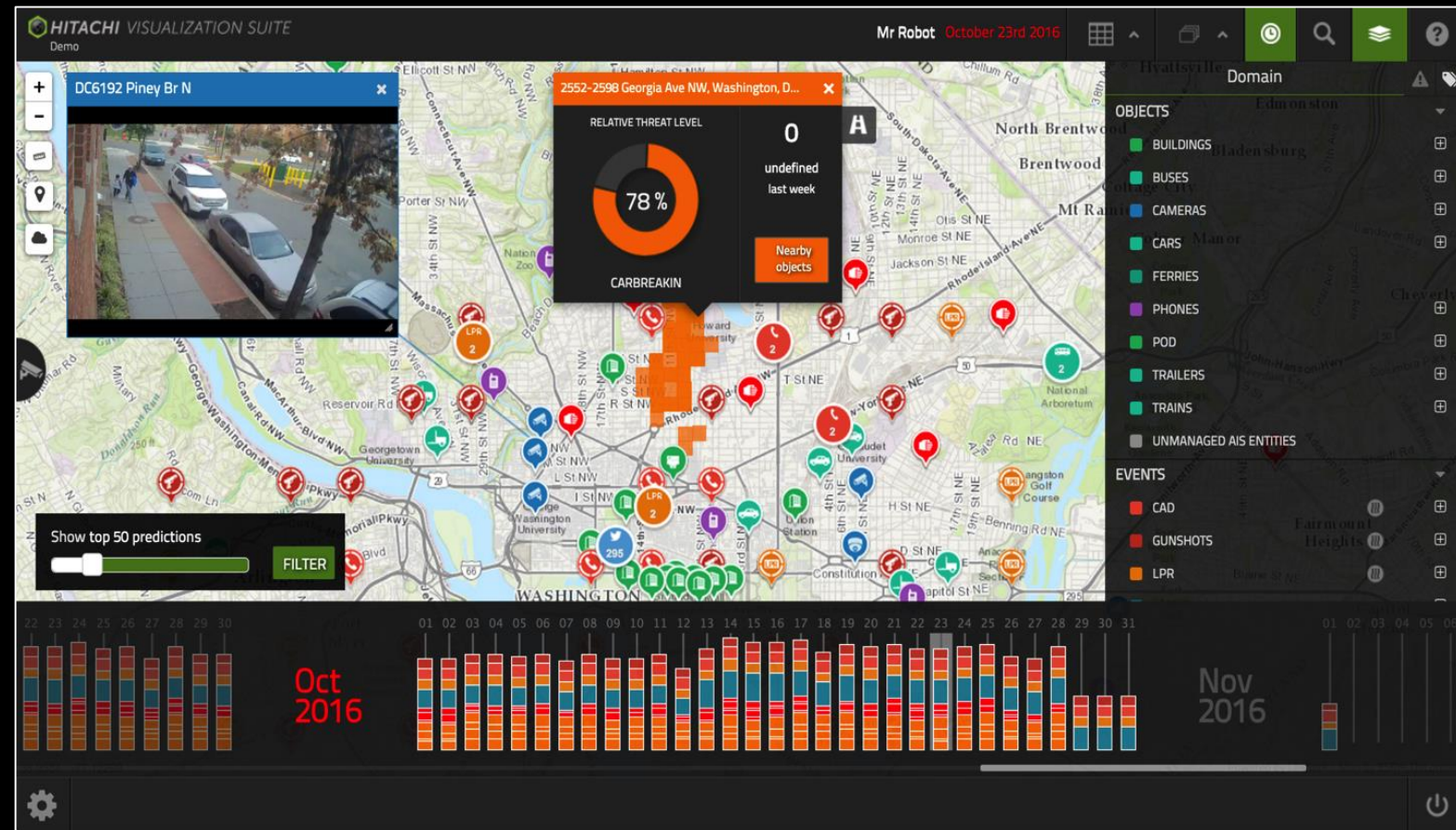
*VMP = Video Management Platform VSP = Virtual Storage Platform HCP = Hitachi Content Platform

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Situational Awareness Through Hitachi Visualization Suite

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- Real-time video and IoT data from facilities, vehicles, infrastructure, security, and shops
- Unlimited data layers on a single pane of glass
- Distributed intelligence for all staff with browser-based desktop or mobile capability
- Workflow automation for setting alerts for customer needs or security incidents

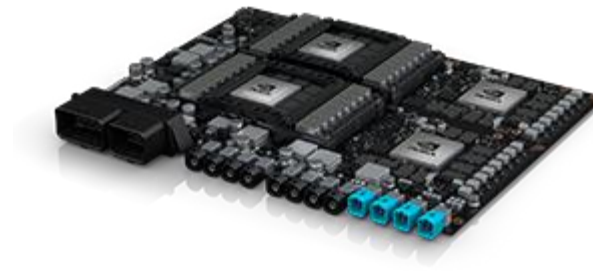


V2V, V2I, C-V2X

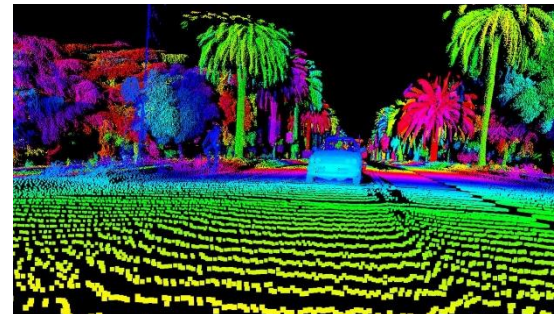


Hardware Innovations

- Cray Computer to cell phone to PS2 Drive



- Lidar Sensors



- Camera Sensors

- AI/ Machine Learning/ Backend Cloud computing and Deep Learning

L4 Our Robust Autonomy Stack

Autonomy

Perception

Prediction

Planning

Controls

Systems

Safety Systems

Redundancy

Diagnostics

Performance

Infrastructure

Mapping

Simulation

Remote Operation

Reliable Network



Evolving Network Needs on the Road-Latency



AUTOMATION LEVELS OF AUTONOMOUS CARS

LEVEL 0



There are no autonomous features.

LEVEL 1



These cars can handle one task at a time, like automatic braking.

LEVEL 2



These cars would have at least two automated functions.

LEVEL 3



These cars handle “dynamic driving tasks” but might still need intervention.

LEVEL 4

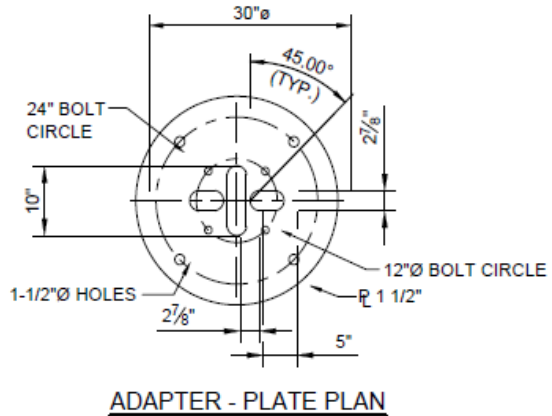


These cars are officially driverless in certain environments.

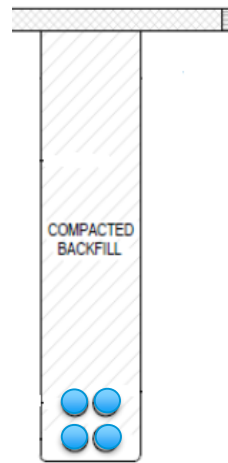
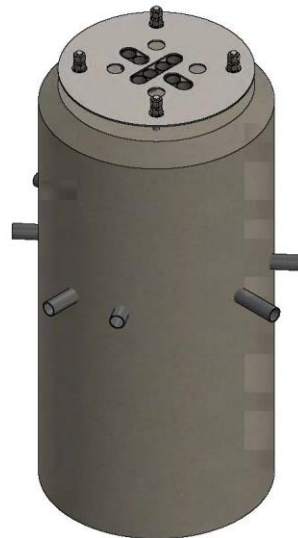
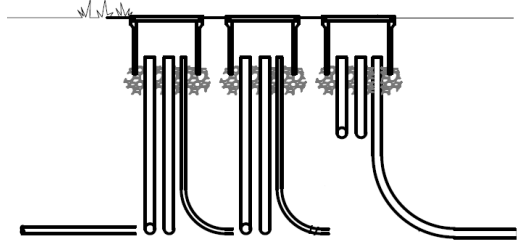
LEVEL 5



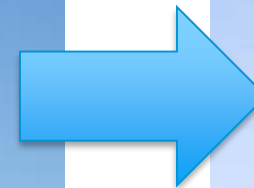
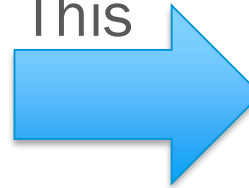
These cars can operate entirely on their own without any driver presence.



“Make Ready” Infrastructure



Allows
This

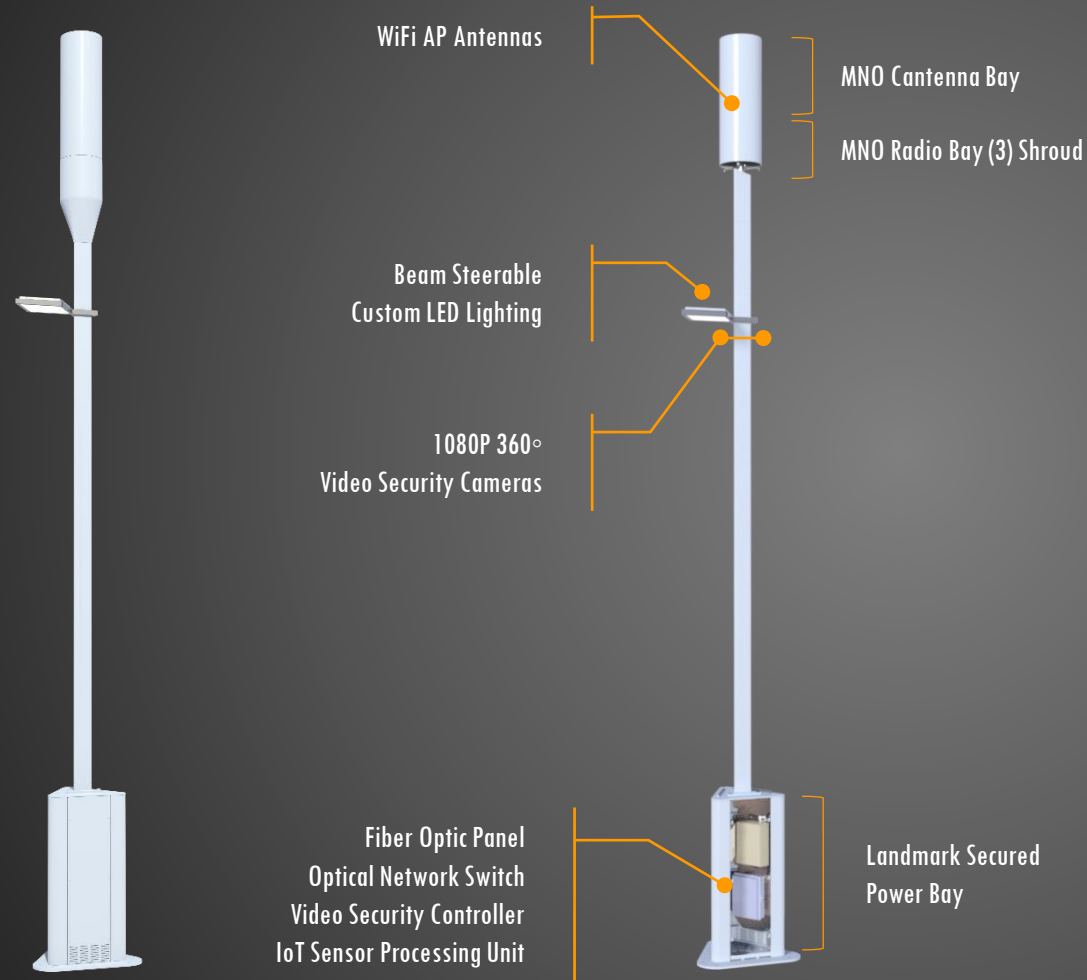


Or
This



- ✓ Company Fiber
- ✓ Shared Fiber
- ✓ Power
- ✓ Street Light Power

Vertex V0^T — Micro Cell Concealment



VERTEX INFRASTRUCTURE HIGHLIGHTS

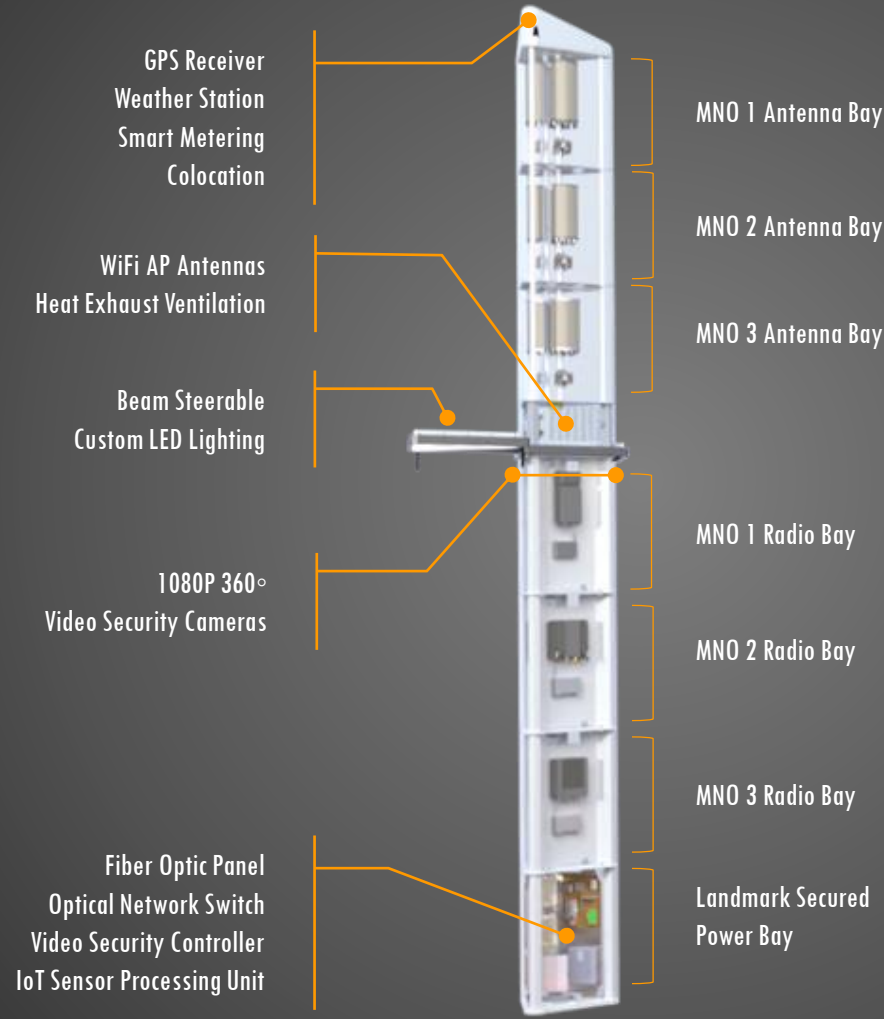
- Multi-Port 4G / 5G Antenna Bay (LB + HB + AIR)
- Vendor Neutral Small Cell Low Power MMRUS Radio Mounting Bay - 3 MRRUS Radios supported
- 15,000 Cubic Inches of Colocation Space
- UL/ULC Certified
- GR487, NEMA, TIA-222 Compliant
- AC & DC Power Systems
- Custom Designed LED Luminaires
- Battery Backup Available

SITE OFFER OPTIONS

- WiFi Services
- Fiber Optic Backhaul/Fronthaul
- Internet Services
- Encryption
- Supports Sensor Nets
- Site Security/Monitoring
- Video Surveillance
- Rackspace / Padmount Colocation
- GPS / SAT Services
- Supports Special Radio Applications — Utility FAN, Meter Collection

Vertex V0^T — Integrated Micro Cell Single Tenant Light Standard

Vertex V1 — Maximum Concealment



VERTEX INFRASTRUCTURE HIGHLIGHTS

- Radio Vendor Neutral
- 4G / 5G — High Band & Low Band
- 80,000 Cubic Inches/Bay
- 12-18 RRUS & 5G AIR Full Concealment
- Baseband & CIPRI CRAN Hub Ready
- Radio / Antenna Vendor Neutral
- UL/ULC Certified
- GR487, NEMA, TIA-222 Compliant
- 240V AC
- AC & DC Power Systems
- Custom Designed LED Luminaires
- Battery Backup Available

SITE OFFER OPTIONS

- WiFi Services
- Fiber Optic Backhaul/Fronthaul
- Internet Services
- Encryption
- Supports Sensor Nets
- Site Security/Monitoring
- Video Surveillance
- Rackspace / Padmount Colocation
- GPS / SAT Services
- Supports Special Radio Applications —
Utility FAN, Meter Collection

Vertex V1 — Integrated Mini-Macro Multi-Tenant Light Standard