

Network Analyst: An Introduction

Patrick Stevens

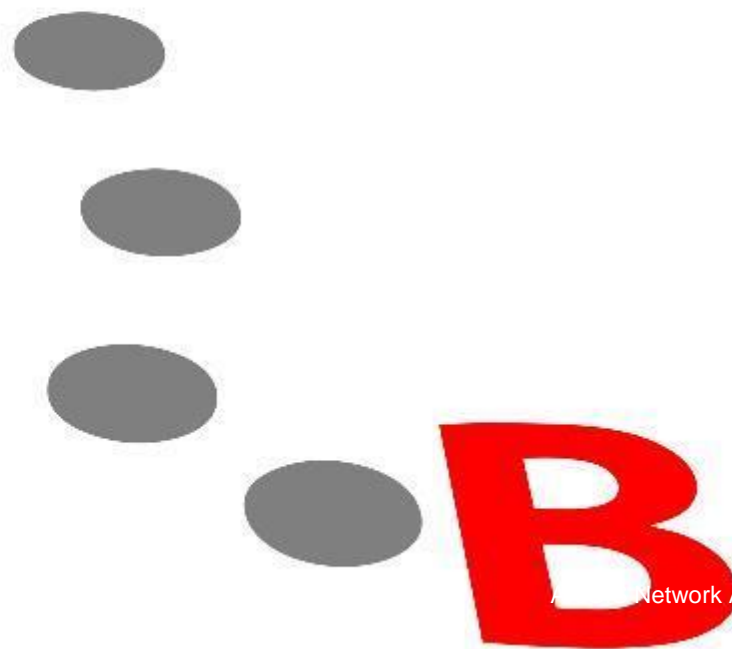
Max Zeng

ArcGIS Network Analyst Extension

...models
transportation



- Less gas used
- Less vehicle maintenance
- Less driver overtime
- More customers serviced
- Optimal locations chosen
- Redundant facilities removed



ArcGIS Network Analyst Extension is ***NOT*** used for utility networks



Utility networks are part of the geodatabase



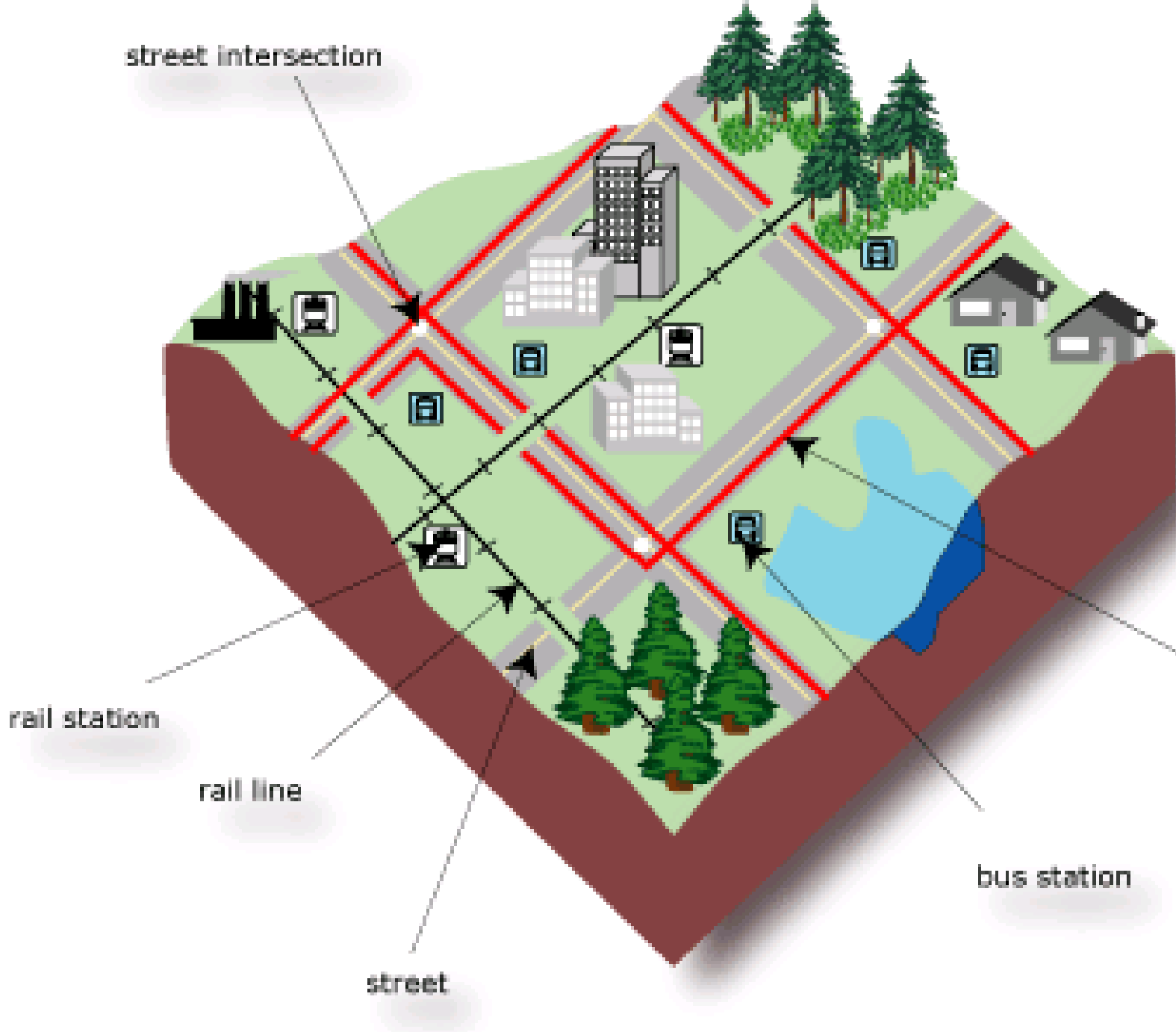
- Analysis types
- Products
- Street networks
- Questions and
resources



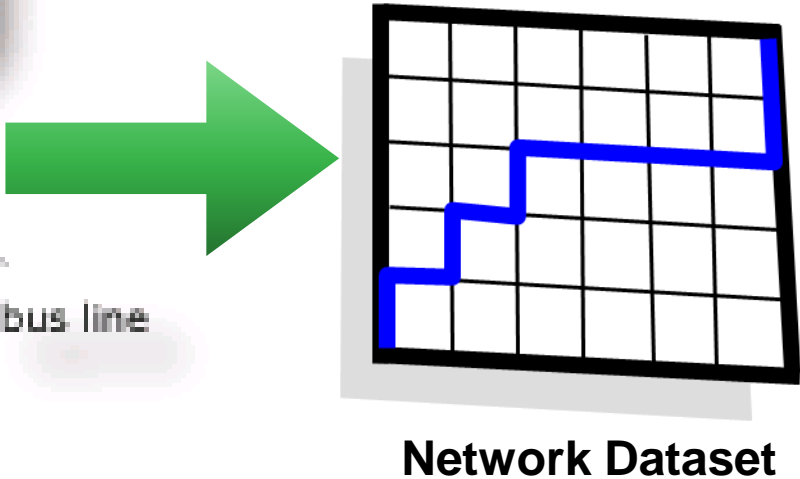
4

Analysis Types





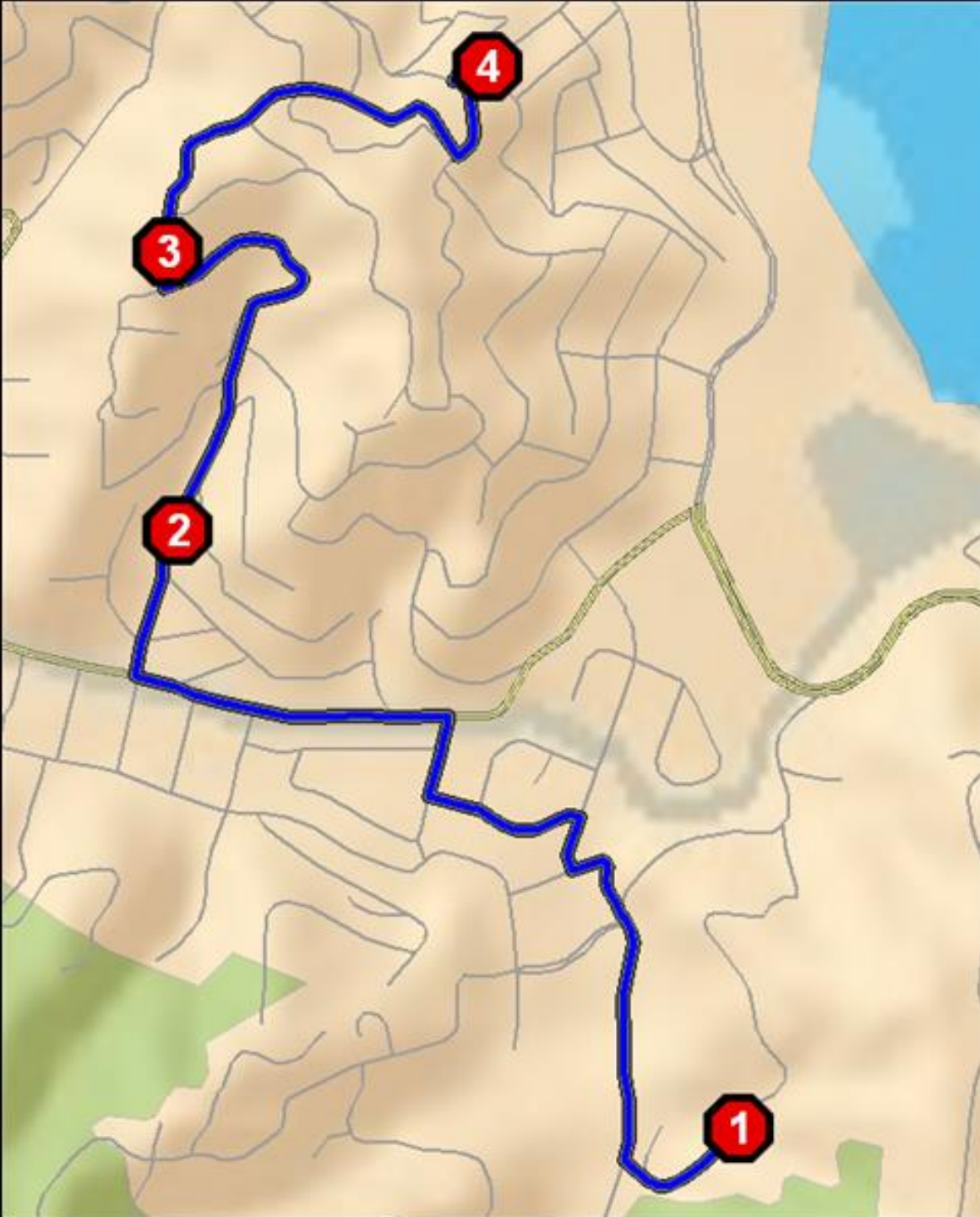
Accurate
modeling





Demo

Directions in ArcGIS Online

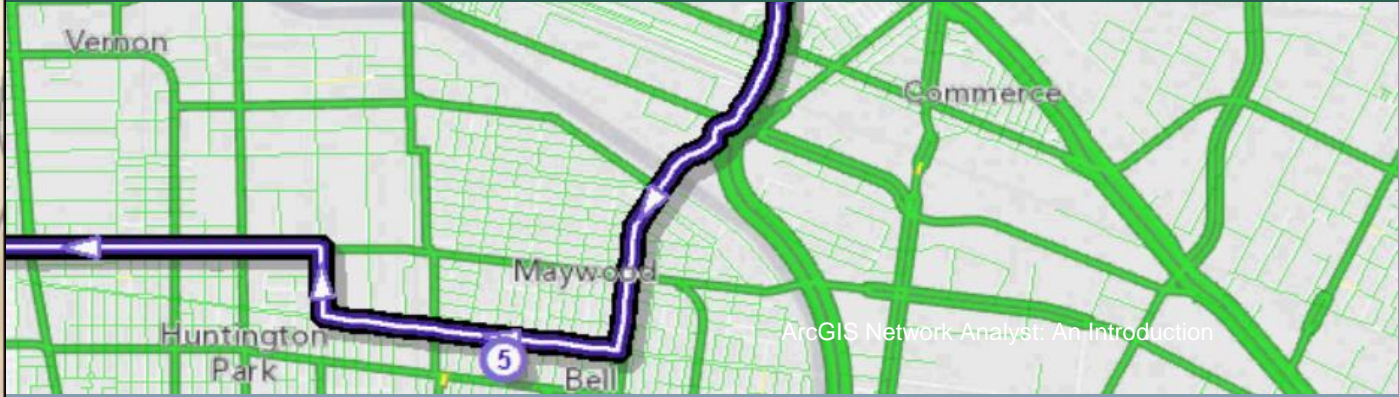
Route in ArcGIS Pro



Find point-to-point routes

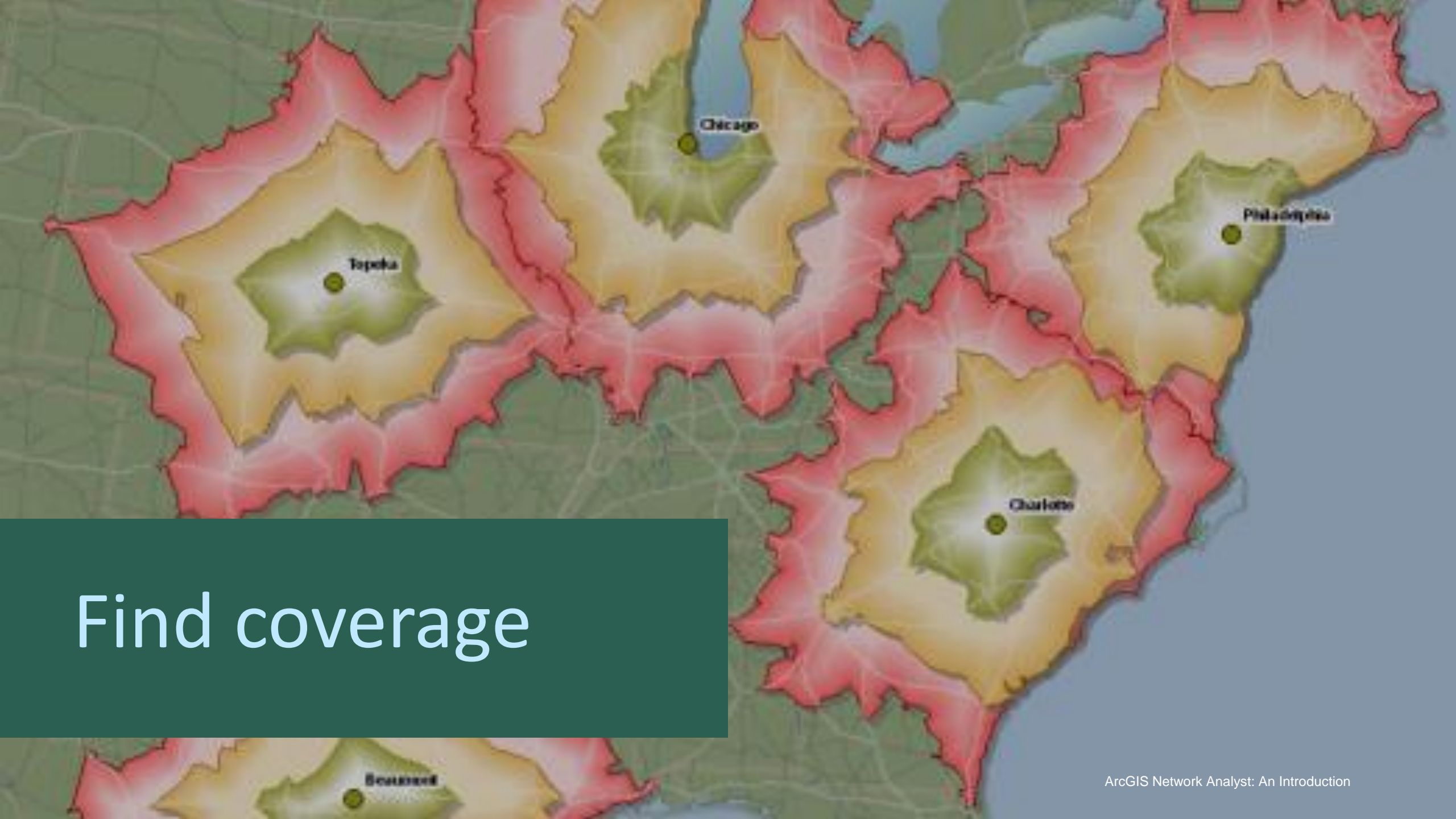
-  Route solver
-  Directions

Connect origins to destinations



The inset map shows a street network with green lines. A purple route is highlighted, starting at point 2 (top) and ending at point 5 (bottom). The route goes south from point 2, then west, then south again to point 5. Labels on the map include Vernon, Commerce, Maywood, Bell, Huntington Park, and Bell.

ArcGIS Network Analyst: An Introduction



Find coverage

Buffer

Service area





Find Coverage



Service Area solver



Create drive-time areas



Select the
optimal site

Select the optimal site



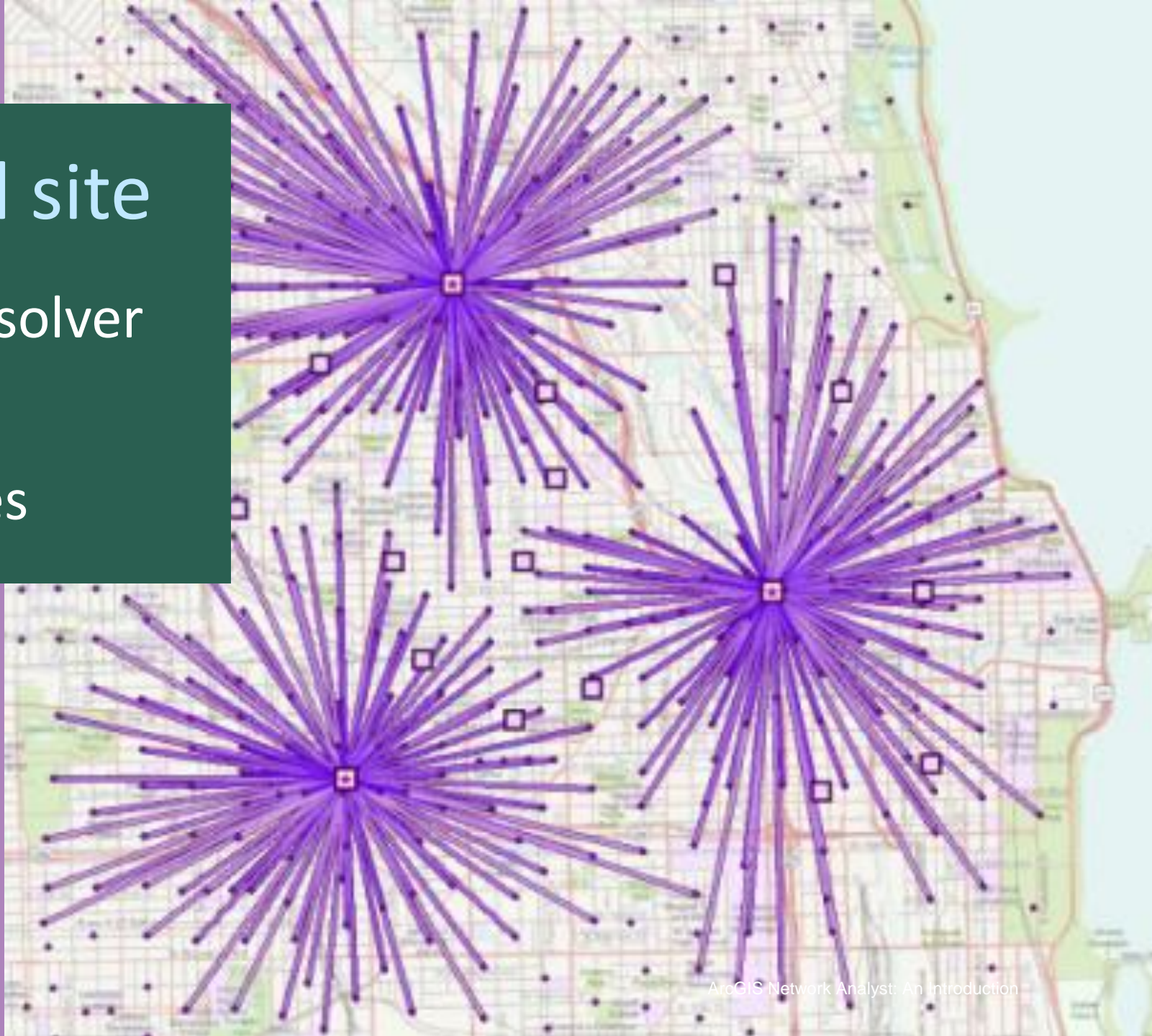
Select the optimal site



Location-allocation solver



Choose best facilities





Demo

Coverage and Site selection

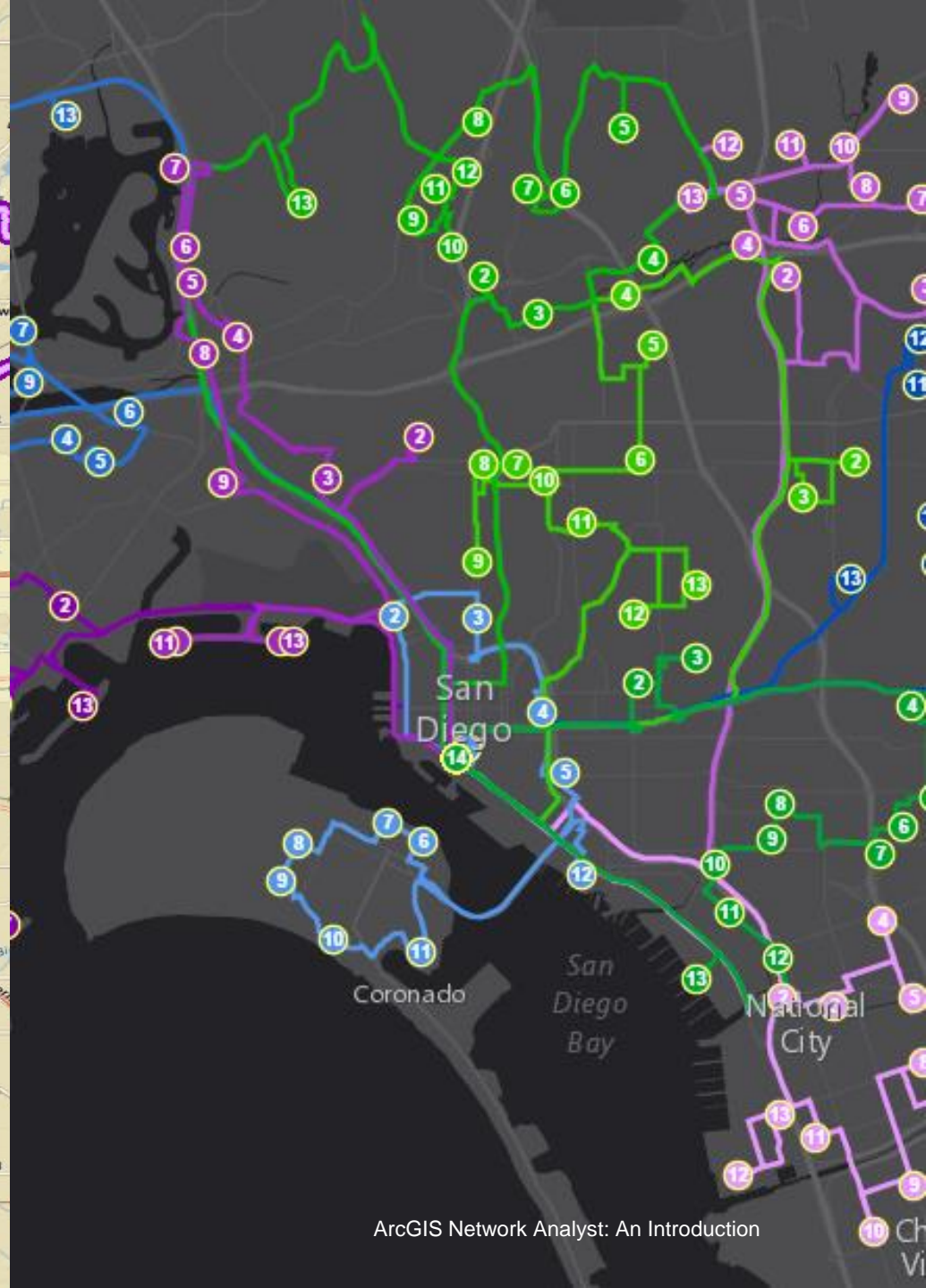
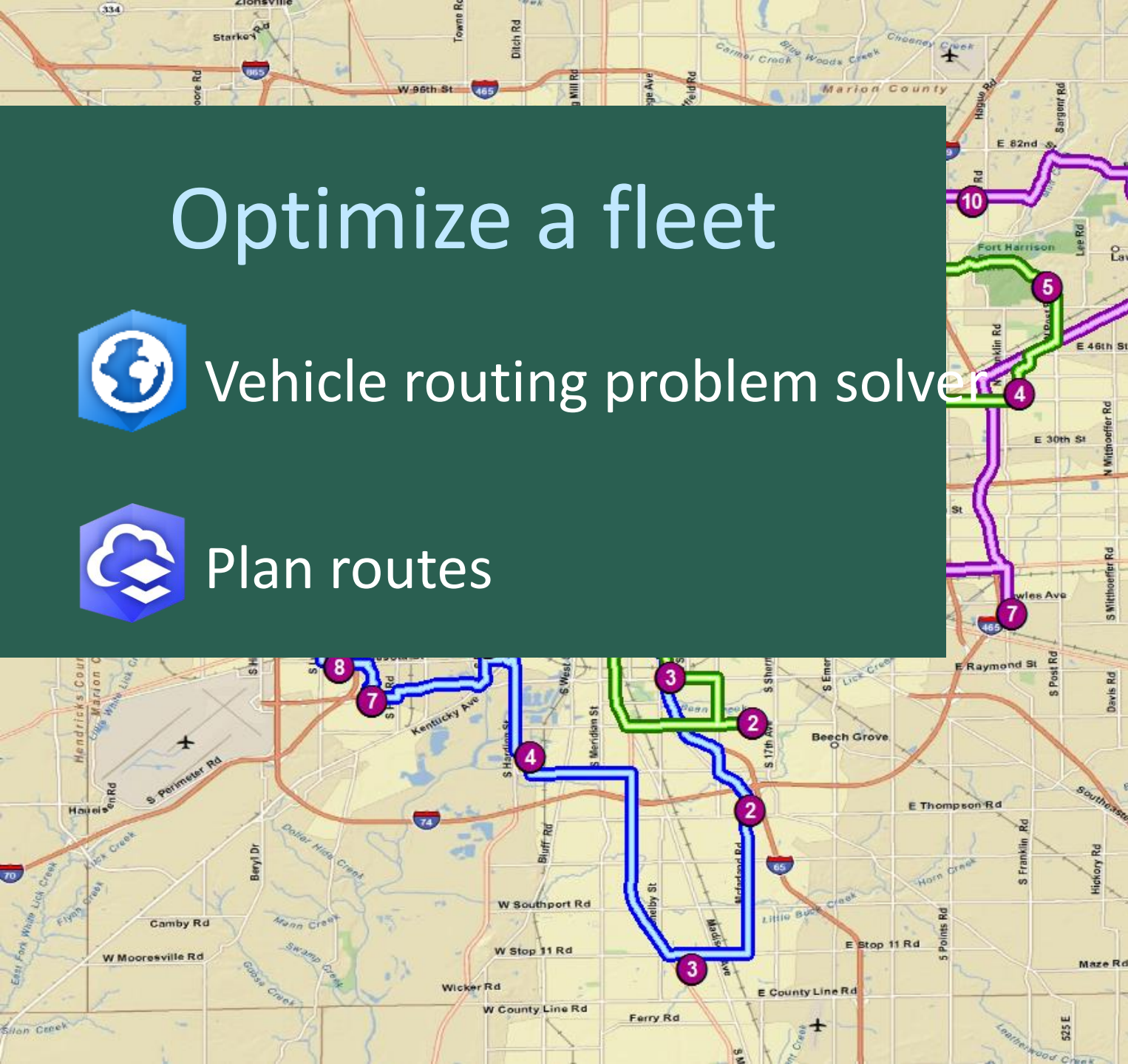
Optimize a fleet

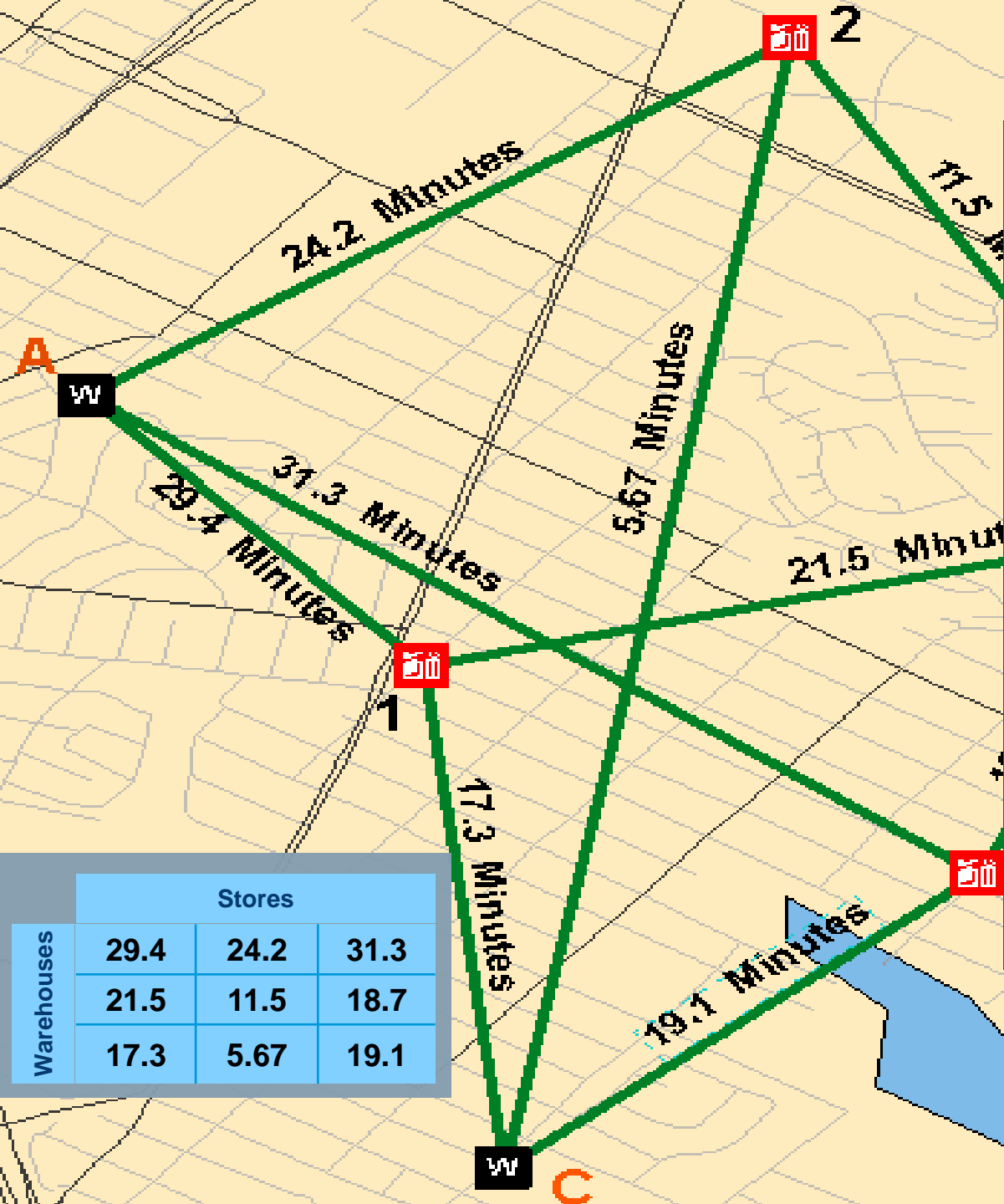


Vehicle routing problem solver



Plan routes





Connect two sets of locations



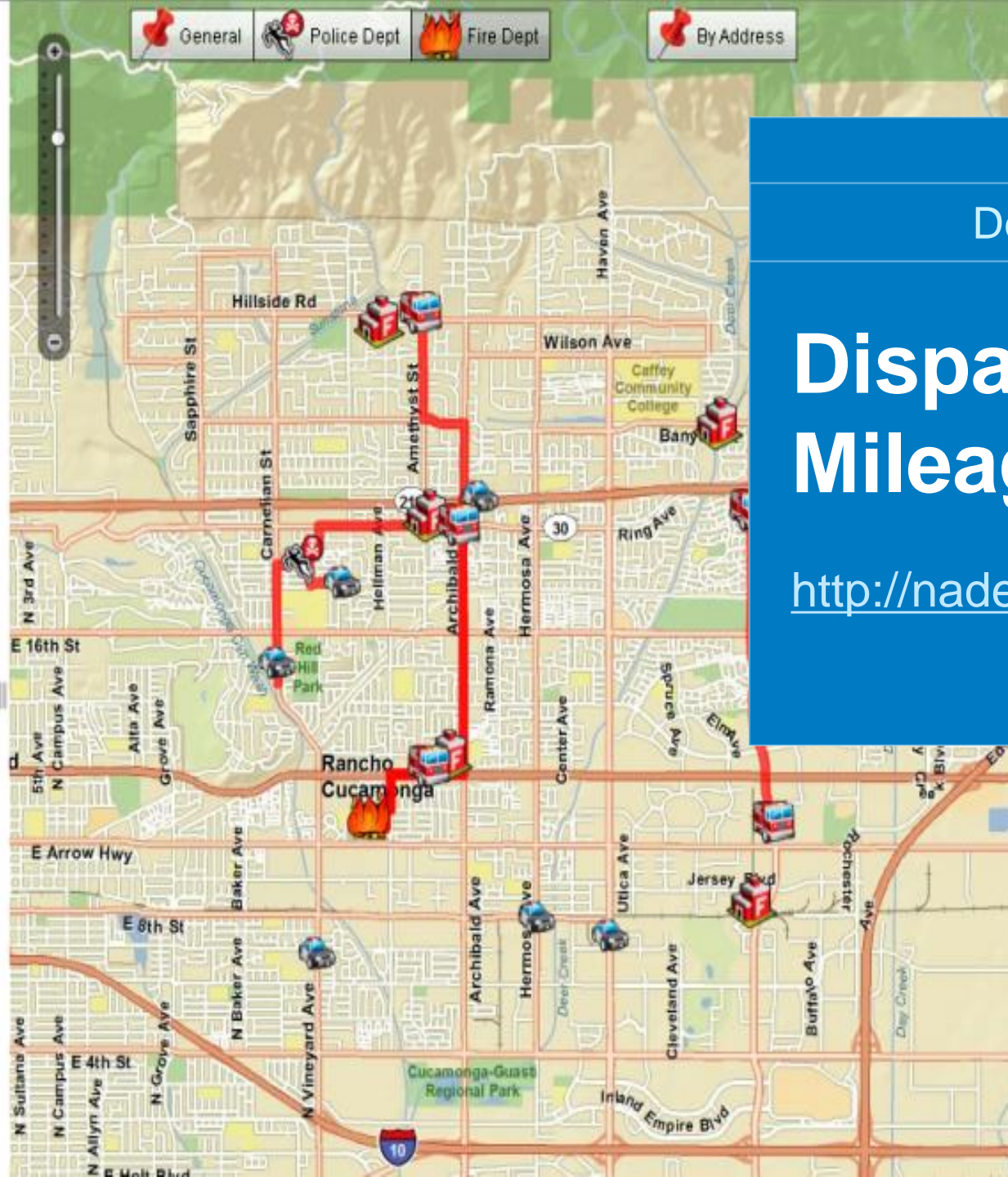
Closest facility solver
OD Cost Matrix solver



Find nearest

| Warehouses | Stores | | |
|------------|--------|------|------|
| | 29.4 | 24.2 | 31.3 |
| | 21.5 | 11.5 | 18.7 |
| | 17.3 | 5.67 | 19.1 |

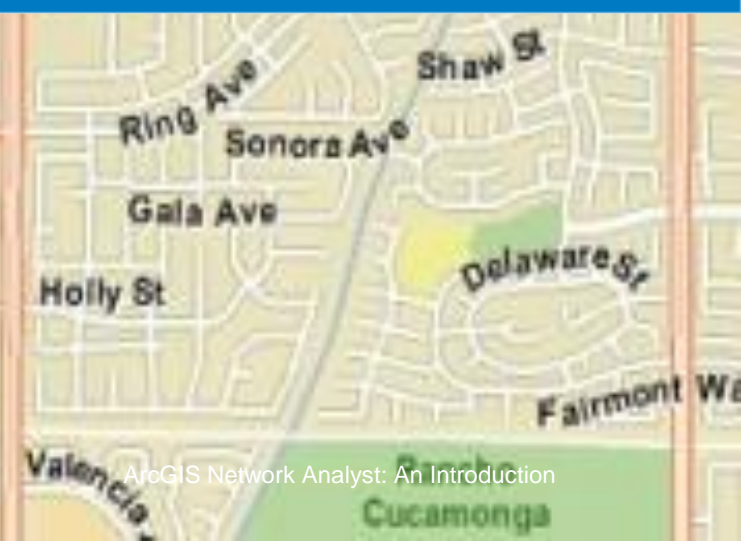
| Vehicle | Status |
|----------------|------------|
| Patrol Unit #1 | Patrolling |
| Patrol Unit #2 | Responding |
| Patrol Unit #3 | Responding |
| Patrol Unit #4 | Responding |
| Patrol Unit #5 | Patrolling |
| Patrol Unit #6 | Patrolling |
| Patrol Unit #7 | Patrolling |
| Fire Truck #1 | Responding |
| Fire Truck #2 | Responding |
| Fire Truck #3 | Responding |
| Fire Truck #4 | Responding |
| Fire Truck #5 | Responding |
| Fire Truck #6 | Idle |
| Fire Truck #7 | Responding |



Demo

Dispatching & Mileage estimation

<http://nadev.arcgis.com/arcgis/samples>



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More about
Products!



License

Street Data

No Credits



- ArcGIS Enterprise
- ArcGIS Desktop
- Geoprocessing
- ArcGIS Runtime
- Navigator



No license

No street
data

Credits



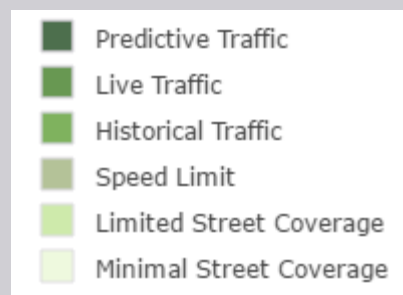
- ArcGIS Enterprise
- ArcGIS Desktop
- Geoprocessing
- ArcGIS Runtime
- Navigator
- Map Viewer



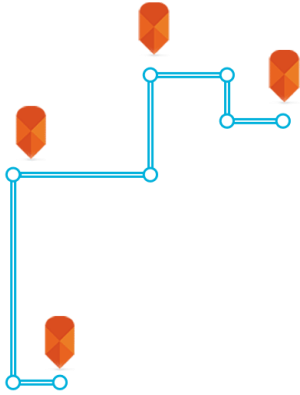
ArcGIS Online

- Managed by Esri
- High-quality data
- Excellent reliability
- No Network Analyst Extension license required

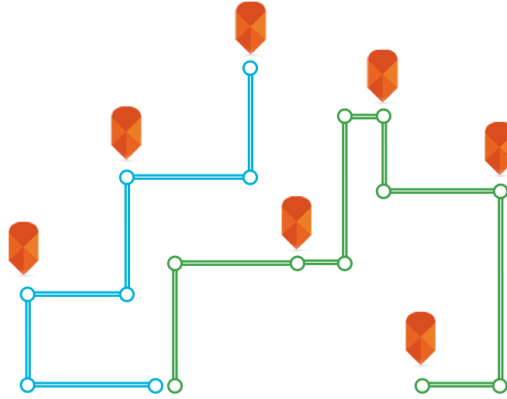
Global coverage



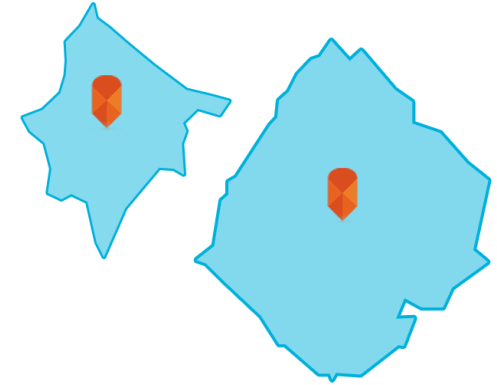
Network services (and credit cost)



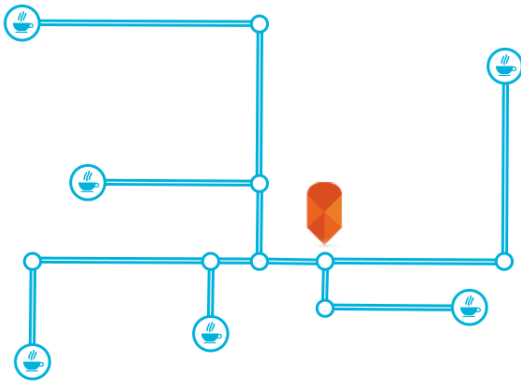
Simple route (0.04 per route)
Optimized route (0.5 per route)



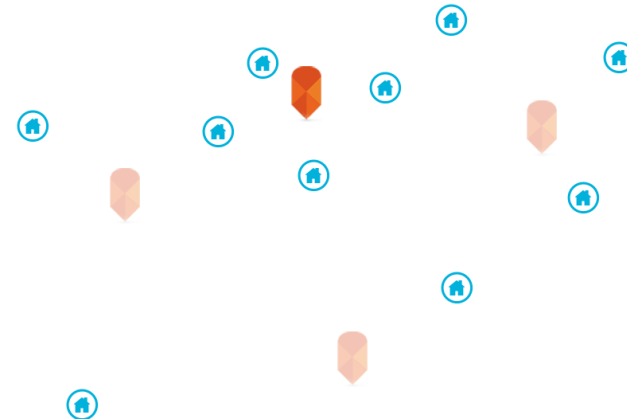
Vehicle routing problem (1 per route)



Service area (0.5 per area)



Closest facility (0.5 per route)



Location-allocation (0.1 per demand point route)

ArcGIS® ArcMap™

10.5.1



esri®

THE
SCIENCE
OF
WHERE™

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ArcGIS®

ArcMap™

10.5.1

ArcGIS Desktop

- Use Pro, except for:
 - Editing network dataset schemas
 - Editing network dataset turns
 - Network dataset layer symbology
 - Publishing network services

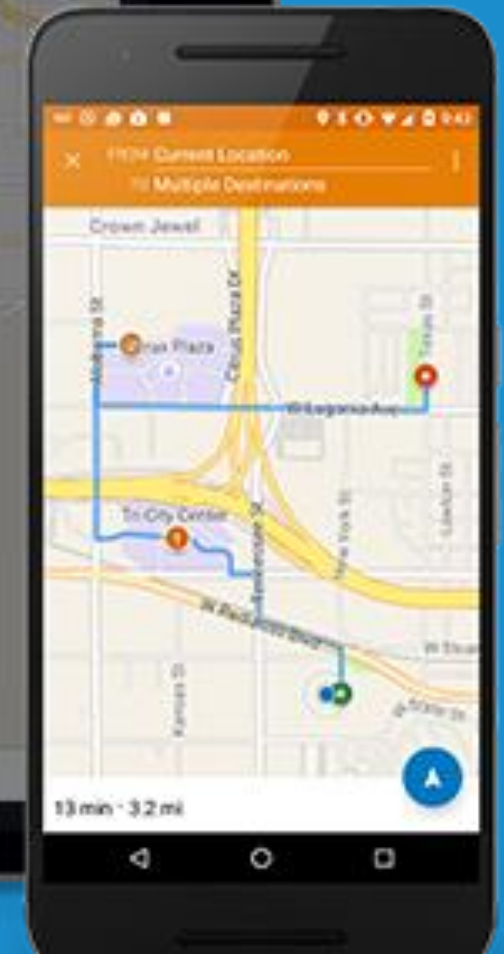
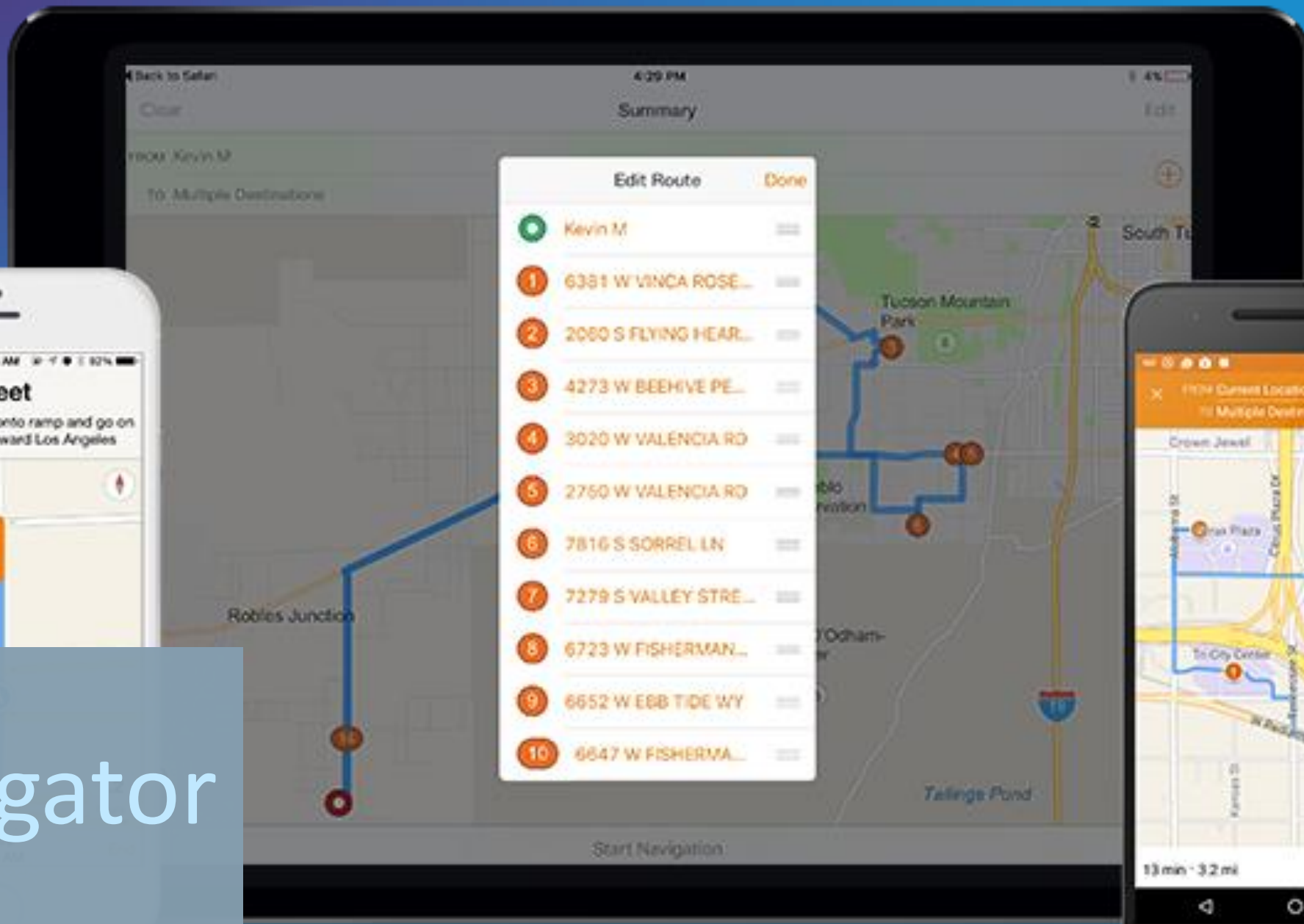
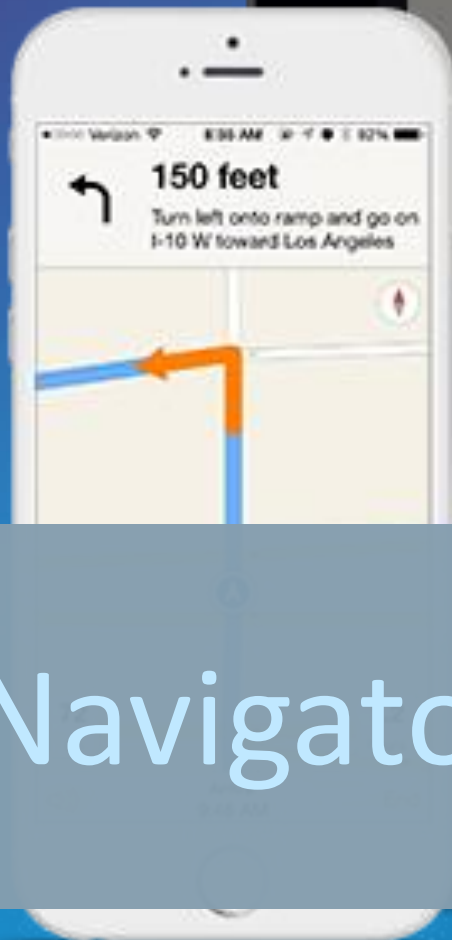


ArcGIS Enterprise

ArcGIS Runtime SDKs

- Android
- iOS
- Java
- macOS
- .NET
- Qt

Navigator



2

Modeling Travel



An aerial photograph of a suburban neighborhood. The image shows a grid of streets with houses, trees, and some swimming pools. The houses have various roof colors, including red, brown, and grey. The streets are paved and have some parked cars. The overall scene is a typical suburban residential area.

Where can I get street data?

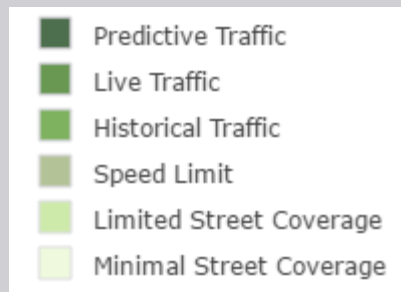
An aerial photograph of a suburban neighborhood, showing a grid of streets and numerous houses with varying roof colors (red, brown, grey). The houses are mostly single-story or two-story, with some featuring swimming pools. The streets are paved and have some parked cars. The overall scene is a typical residential area.

You can make your own network dataset

- Use your organization's data

Maybe you don't need street data

- Use credits for analysis





You can make your own network dataset

- Use free government data

United StatesTM
Census
Bureau

You can make your own network dataset

- Use crowdsourced data



You can purchase data

- Street Map Premium from Esri



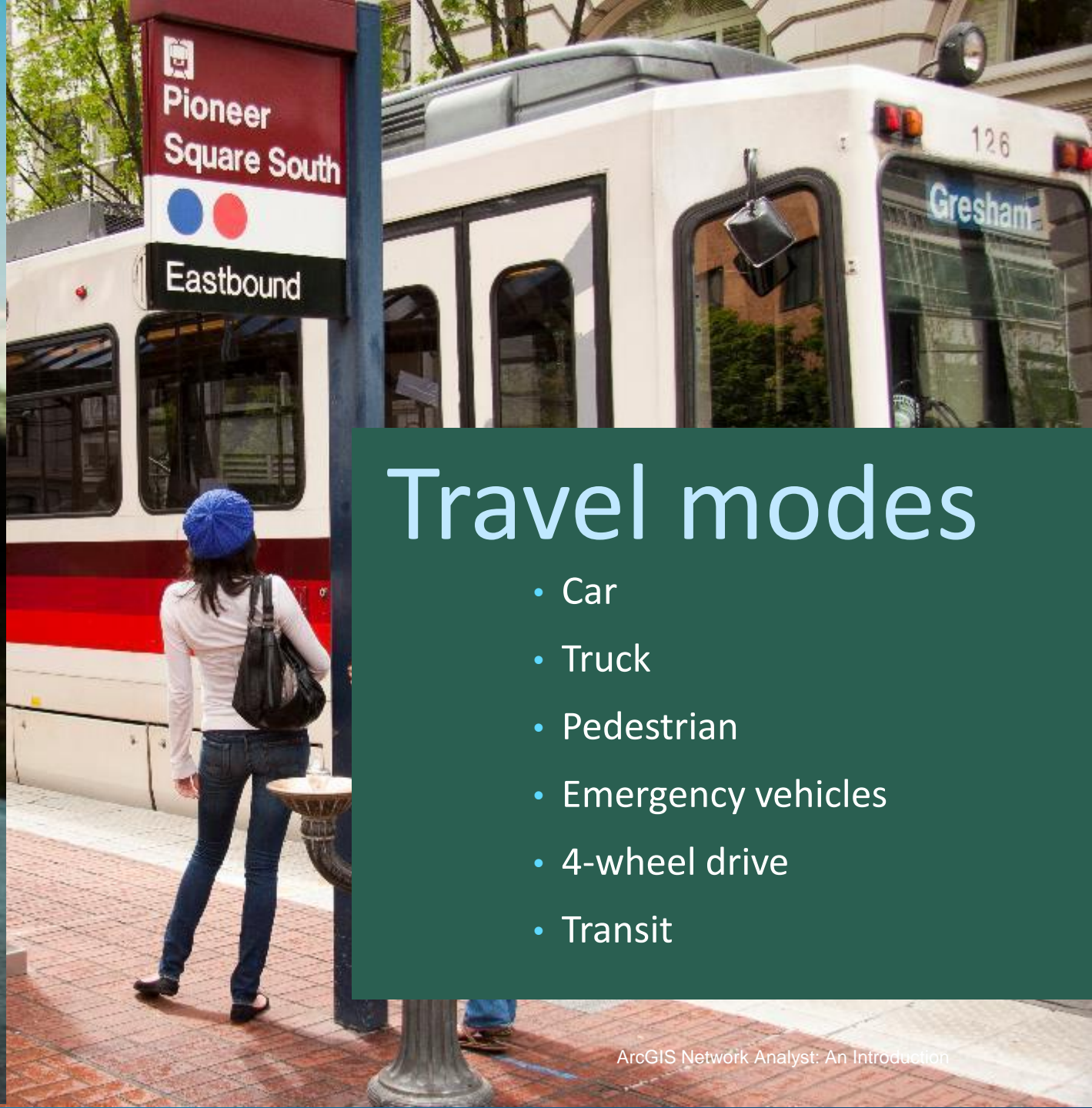
You can purchase data

- Street Map Premium from Esri





Streets are
connected




Travel modes

- Car
- Truck
- Pedestrian
- Emergency vehicles
- 4-wheel drive
- Transit

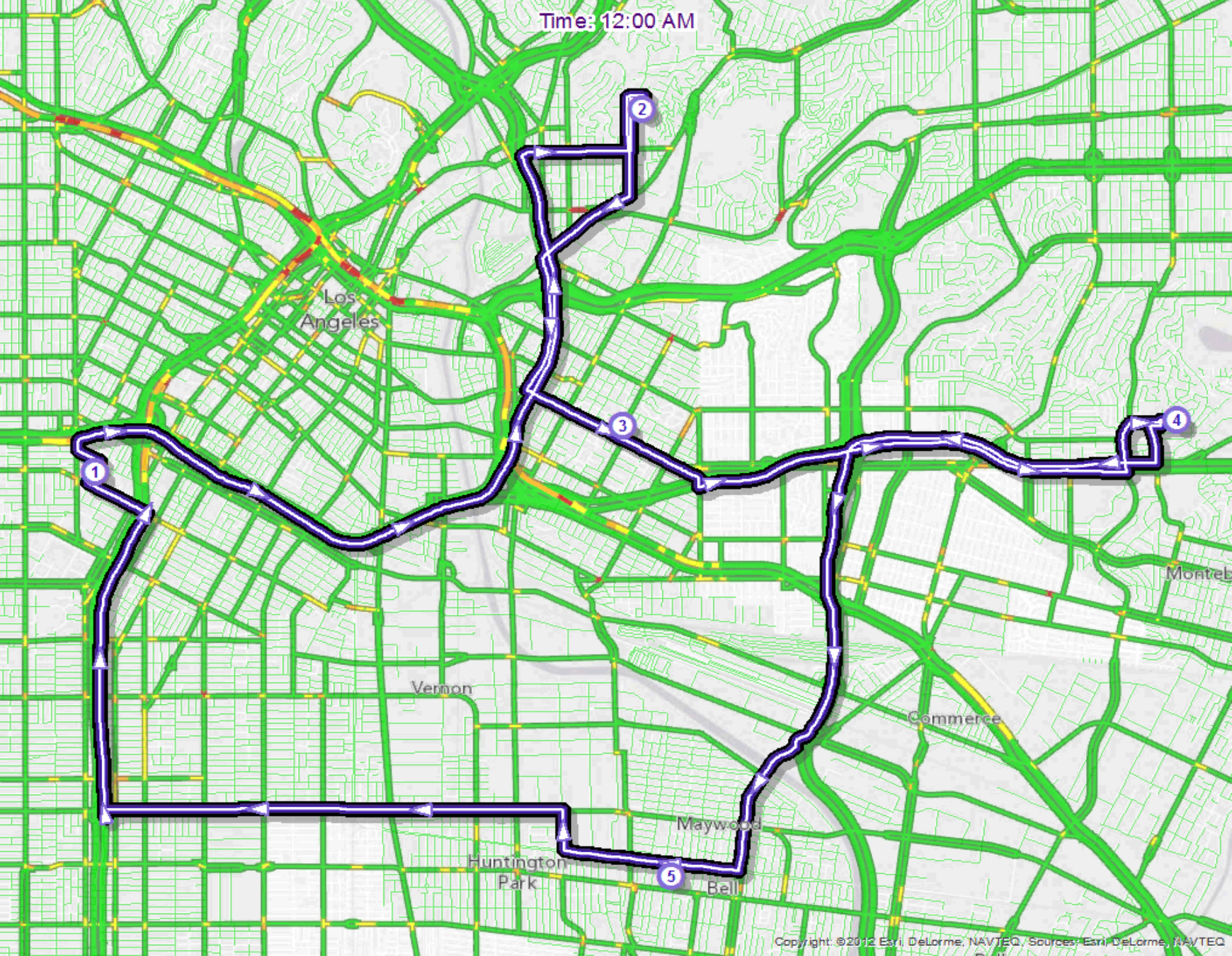


Restrictions
can depend on street characteristics



12'- 6"

Restrictions
can depend on vehicle
characteristics

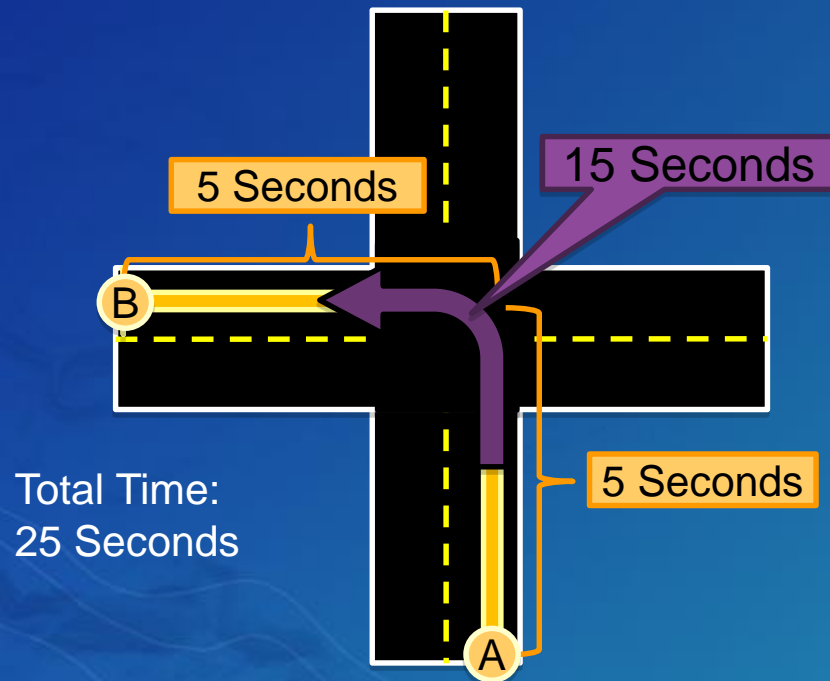


Traffic



Turns
can restrict travel

Turns can add time




Barriers can restrict travel

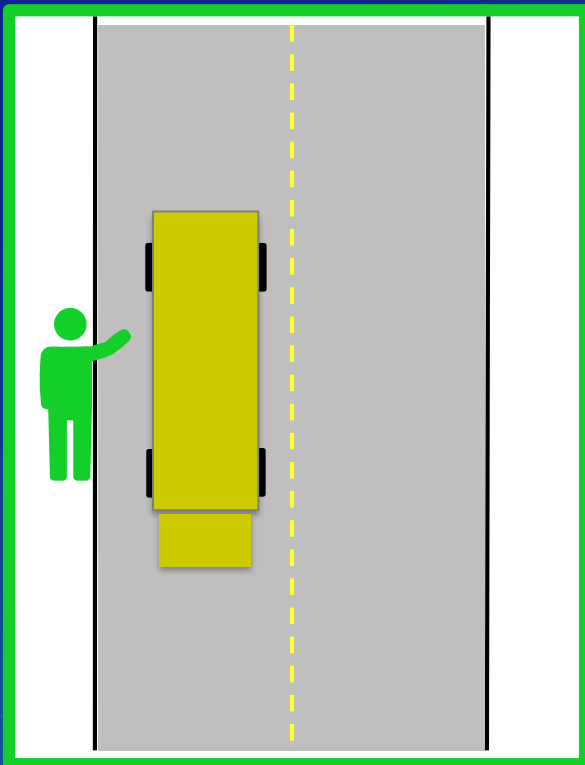


Barriers
can restrict travel

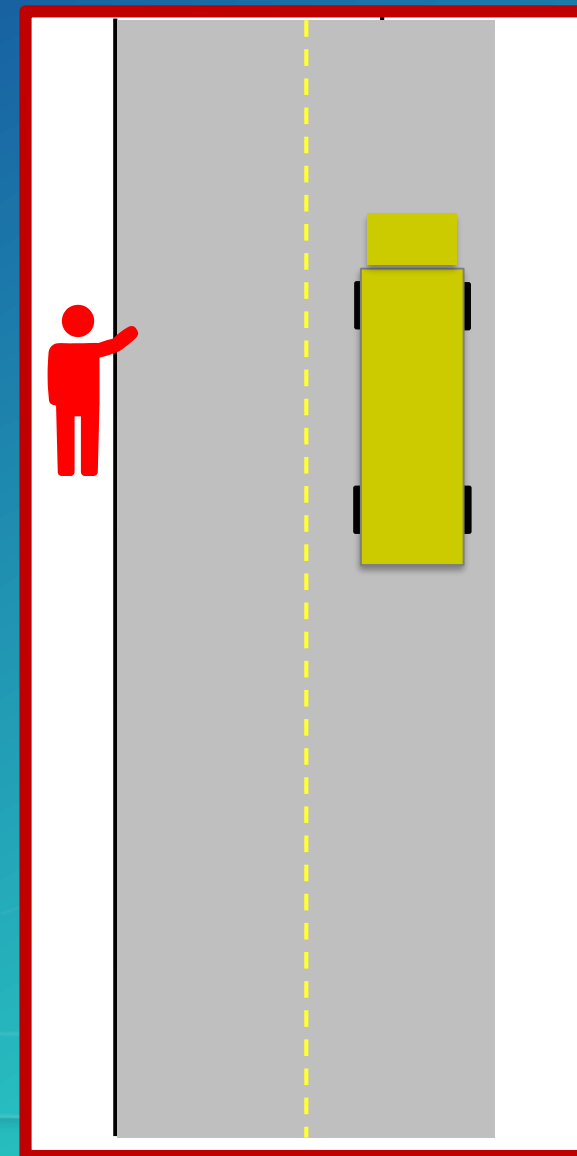




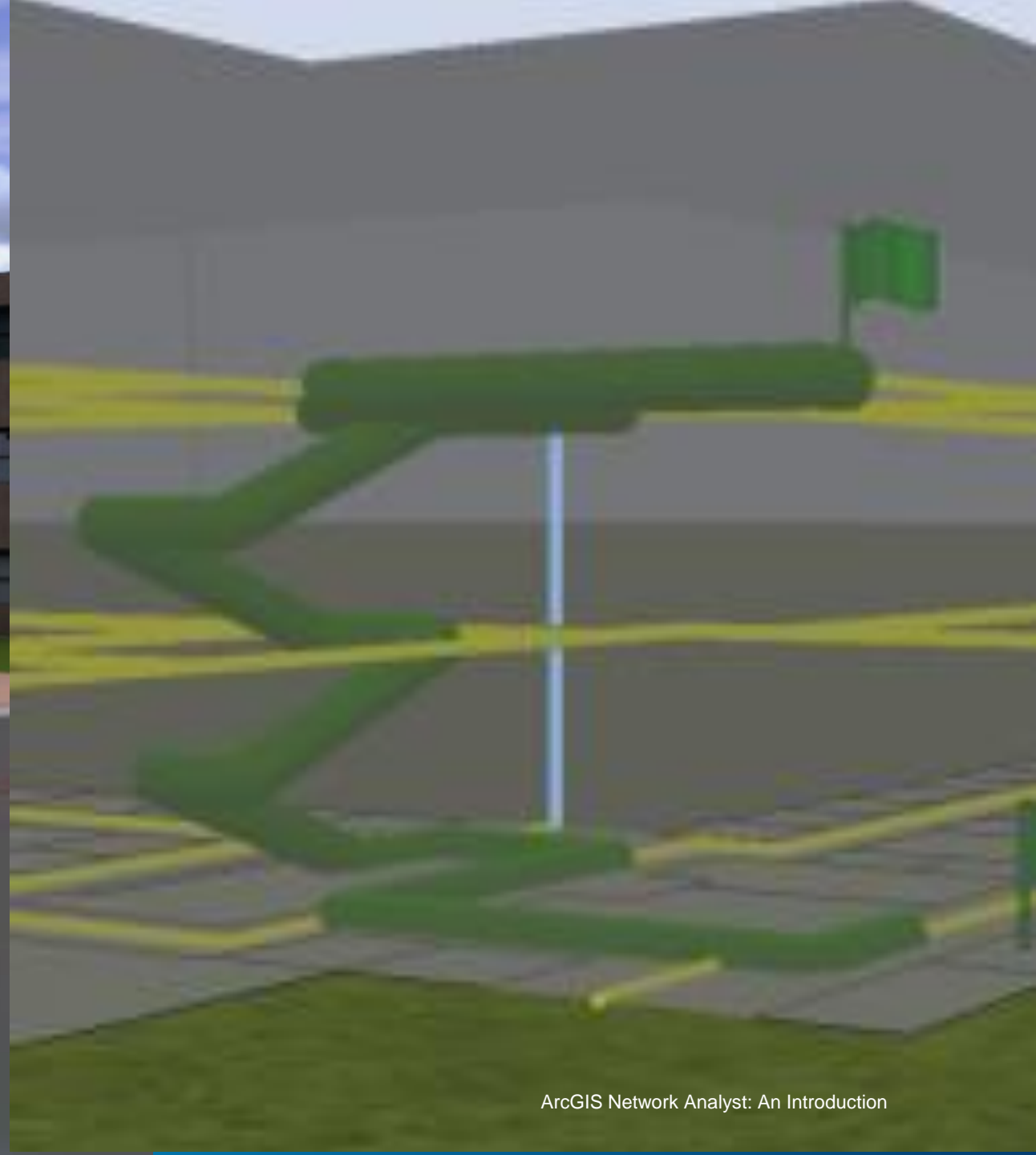
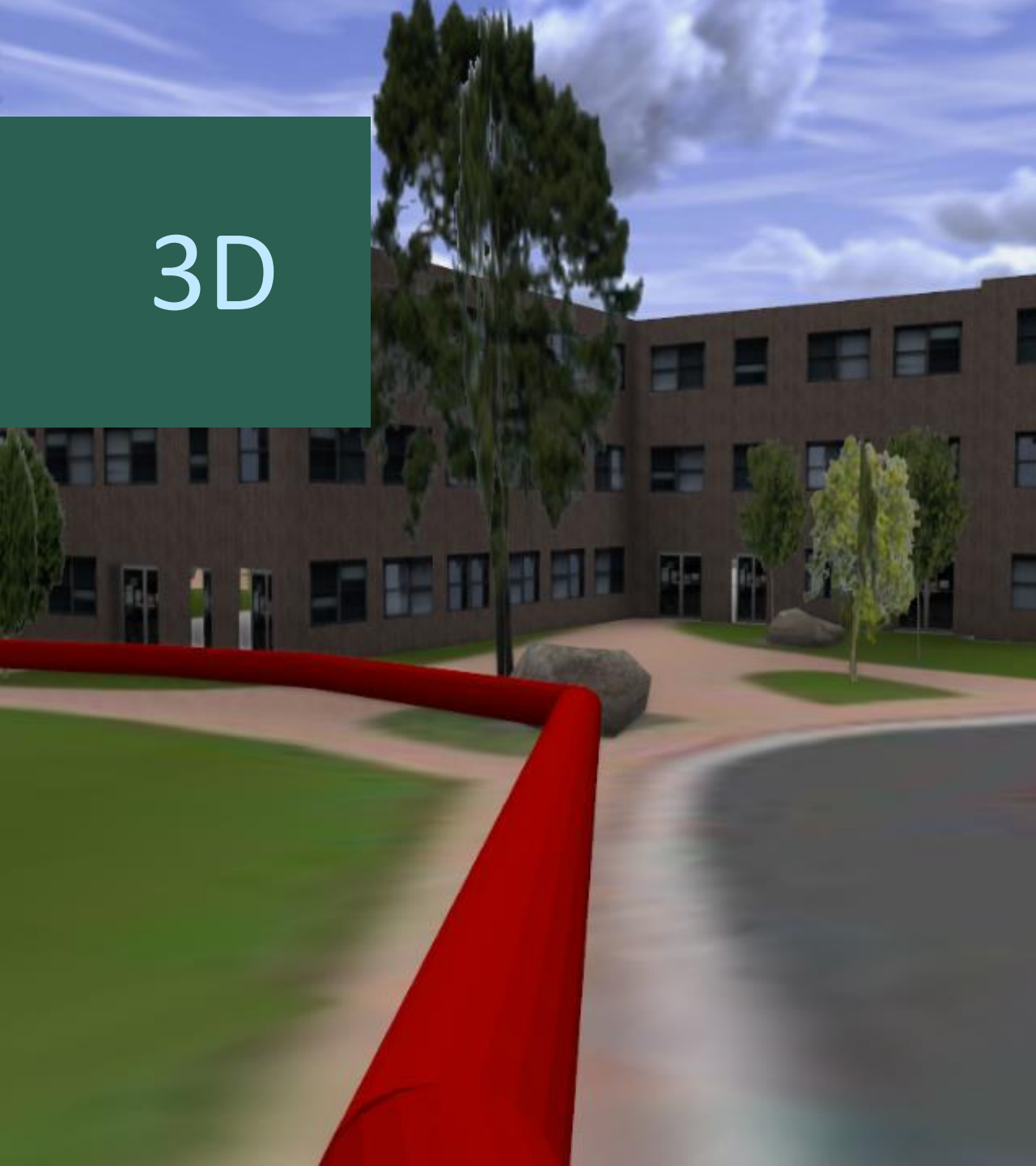
Barriers can slow travel



Side of the road



3D



Slope



A nighttime photograph of a city skyline across a body of water. The city lights are reflected in the calm water. In the foreground, there are large, dark rocks and a piece of driftwood. A blue rectangular overlay covers the right side of the image, containing the text 'Demo' and 'Modeling travel'.

Demo

Modeling travel

1

...and
the rest



Common questions

- Does Network Analyst support high-density routing?

Common questions

- Can I get alternate shortest paths?

Common questions

- Can Network Analyst work with transit schedules?

Support and resources

- [Network Analyst tutorial](#)
- [Network Analyst documentation](#)
- [ArcGIS Network Analyst Extension Discussion Forum](#)
- [Creating network datasets](#) video





- **ArcGIS Network Analyst Extension...**
 - **Makes it easy to do sophisticated analysis**
 - **Offers many types of analysis**
 - **Works across products and skill levels**
 - **Models transportation networks accurately**