

**NENA Standards Update:**  
NSGIC 2021 Annual Conference



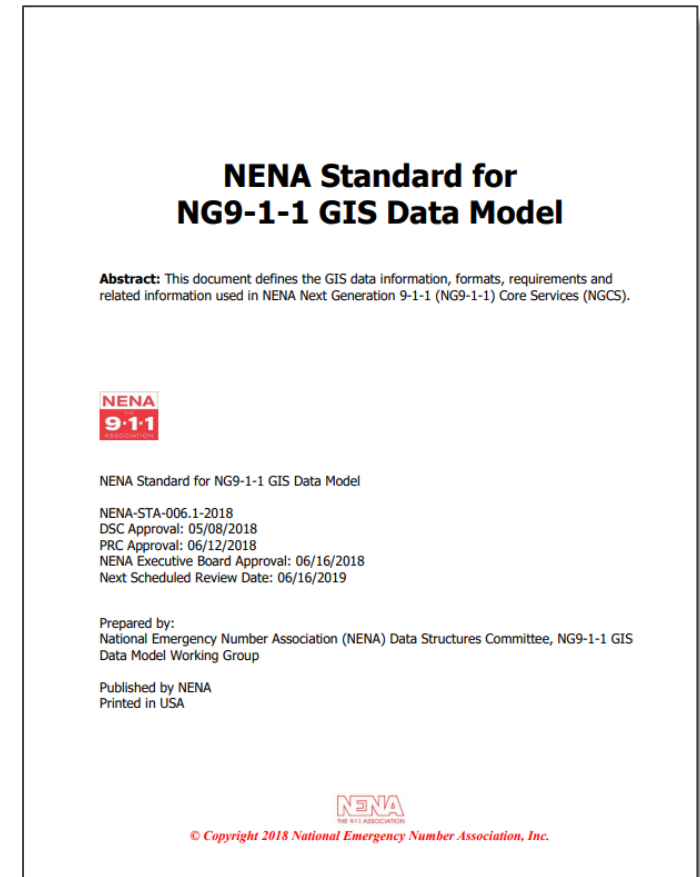
Richard Kelly  
NENA Liaison to NSGIC

# i3 Architecture Standard

- **NENA-STA-010.3-2021** approximately 670 pages. The i3 standard supports end-to-end IP connectivity with gateways used to accommodate 'legacy' wireline and wireless origination networks that are non-IP, as well as legacy Public Safety Answering Points (PSAPs) that interconnect to the i3 solution architecture. NENA i3 describes the concept of an Emergency Services IP network (ESInet), that can be shared by all public safety agencies and a set of core services that process 9-1-1 calls on that network to utilize NG9-1-1 Core Services (NGCS).
- GIS Related Sections:
  - Section 3.6 Spatial Interface (SI) for layer Replication
  - Section 3.7 Discrepancy Reporting (DR)
  - Section 4.3 Emergency Call Routing Function (ECRF) and Location Validation Function (LVF)
  - Section 4.4 MSAG Conversion Service (MCS)
  - Section 4.5 Geocode Service (GCS)
  - Section 4.13 Forest Guide (FG)
  - Section 4.19 Mapping Data Service (MDS)
  - Section 10.32 "GIS Data Layers" Registry"
  - Appendix B – SI Provisioning Data Model (Machine to Machine)

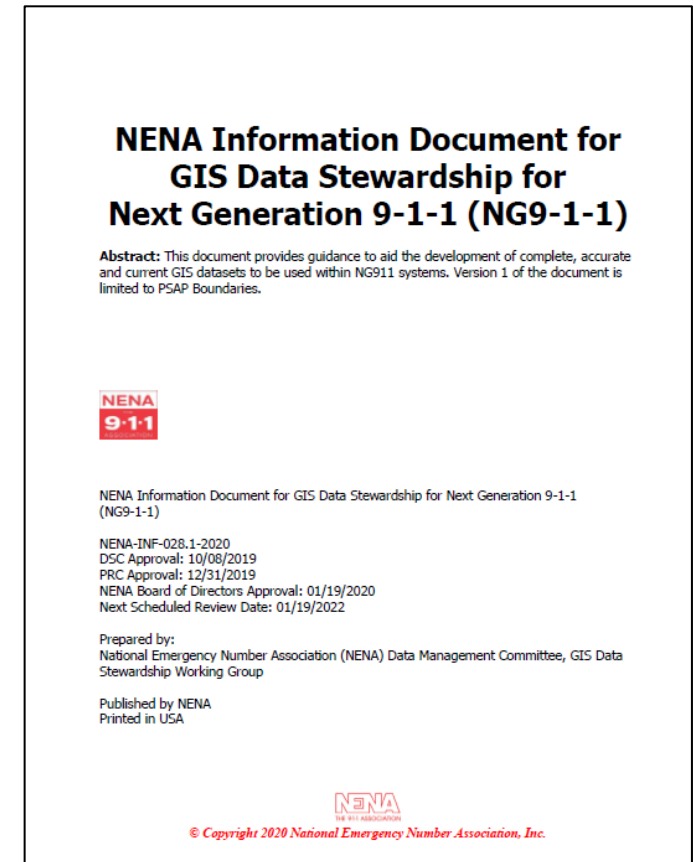
# Standard for NG9-1-1 GIS Data Model

- ANS CANDIDATE **NENA-STA-006.2-202X** defines the GIS data structure for use in NG9-1-1 and for interoperability exchange.
- GIS data layers REQUIRED:
  - Section 3.1 - Road Centerlines
  - Section 3.2 - Site / Structure Address Points
    - Landmark Naming
  - Section 3.3 - Service Boundaries
    - Primary PSAP
    - Primary Emergency Services (Law, Fire, EMS, etc.)
  - Section 3.4 – Provisioning Boundaries
- Support for Canada (ex. Additional Code).
- Specific Unique ID structure defined and mandated.
- GIS Data Layers Registry support.
- Database Structure Crosswalk Tables.



# — NG9-1-1 GIS Data Stewardship for NG9-1-1

- Current version of NENA-INF-028.2-2021 DRAFT covers (*topics listed below are not subsection names*)
  - Section 4.1 Road Centerlines
    - Requirements
    - Recommendations
    - Phased approach
  - Section 5.0 'Service Boundary' Layers
  - Section 5.2 PSAP Boundary
    - Requirements
    - Recommendations
    - Phased approach
  - Section 5.3 Response Agency Boundary
    - Requirements
    - Recommendations
    - Phased approach
- Target for review, adoption and release: End of 2022?
- Site, Structure, and Address Point (SSAP) Best Practices WG to follow (Date TBD).



# NENA 3D GIS Workgroup

- November 2014 'Roadmap' agreement established between FCC, NENA, APCO, and 4 CMRS providers.
- FCC 4<sup>th</sup> Report & Order (15-9) – January 29, 2015 provides new accuracy requirements for:
  - Vertical accuracy (Z).
  - Dispatchable Location (Subaddressing).
- FCC 5th Report & Order - October 29, 2019
  - Vertical accuracy metric of plus or minus 3 meters for 80 percent of wireless E911 calls.
  - Require wireless carriers to validate through testing that their z-axis technology meets this metric.
  - Sought comments on testing and alternative approaches for wireless carriers to report caller's specific floor level.
- This document, NENA-REQ-003.1-2021 is intended to:
  - Educate readers about 3D Location technology and regulations that govern them.
  - Provide guidelines and requirements for operationalizing 3D location.
  - Provide requirements for implementation and future standards development.
  - Outline the regulatory background in Europe, Canada and the United States.

# Vertical Measurement Terms

Term	Description
Altitude	The measurement of the device's orthogonal distance from WGS84 ellipsoid. Often referred to as "Height Above Ellipsoid" (HAE). This is equivalent to the term "Z Coordinate" in previous editions of the NENA Master Glossary.
Elevation	The orthogonal distance of the Earth's surface from the WGS84 ellipsoid at a provided location; also, the Altitude of the ground level.
Height	The distance between Elevation and Altitude for a given location; often referred to as "Height Above Ground Level" (AGL).

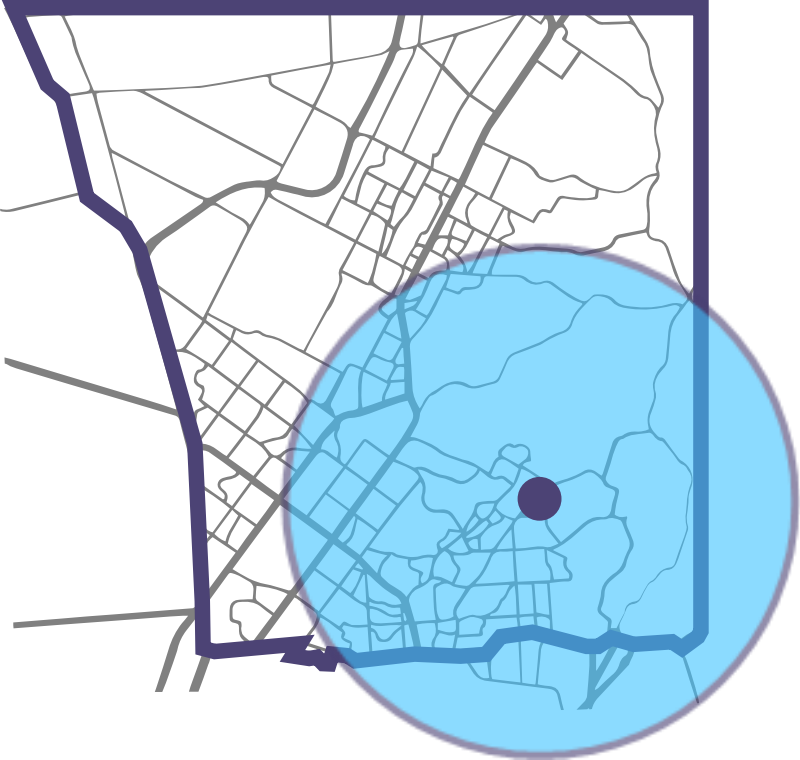
- Civic Location: A provisioned address
- Dispatchable Location: An estimated address
- Geodetic Location: Coordinates (X, Y, Z, Uncertainty)
- Stated Location: (*"What is the address of your emergency?"*)



# 2D Geodetic Location With a Map



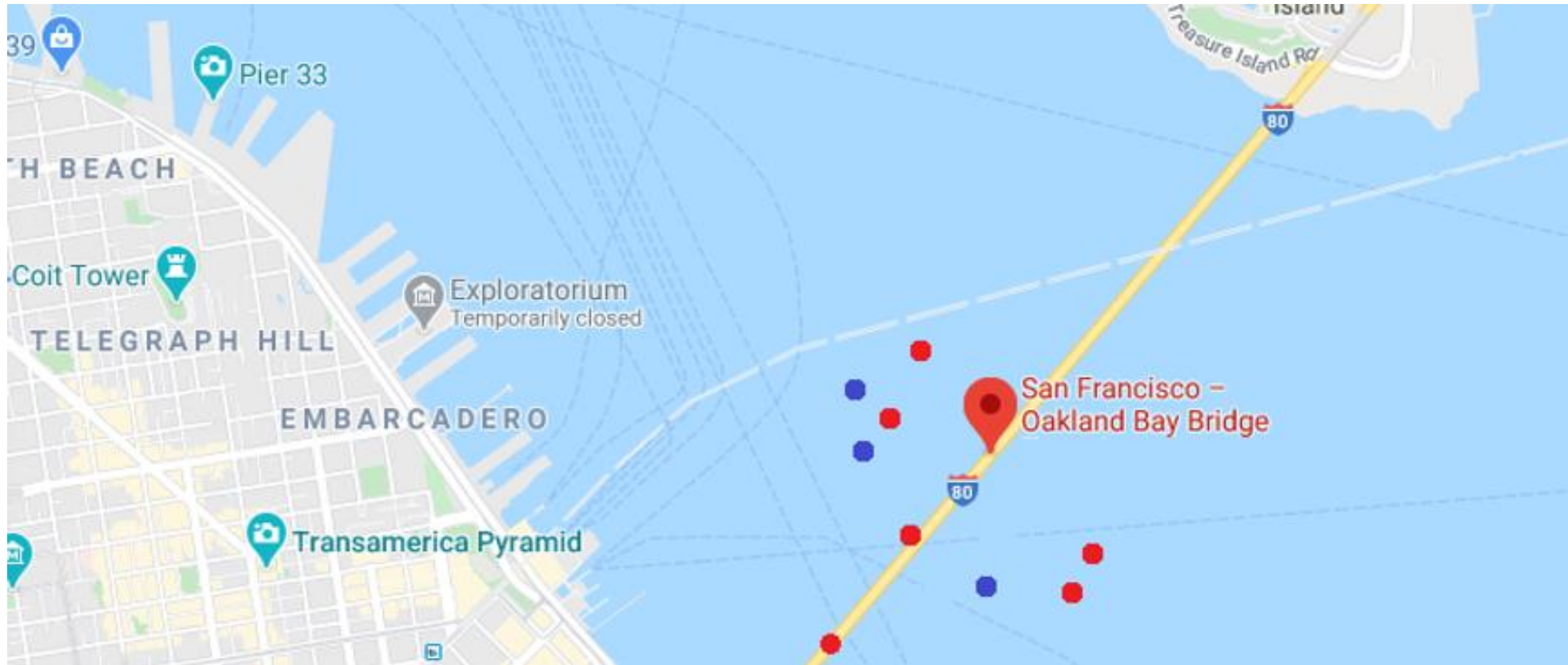
38.8506697 N  
-77.0593877 W



38.8506697 N  
-77.0593877 W

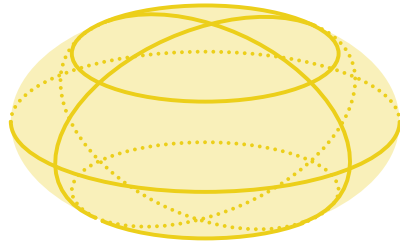
# Operationalizing Z Axis Information

- Calls at **red** dots represent an *'Altitude'* at around local sea level
- Calls at **blue** dots represent an *'Altitude'* above sea level

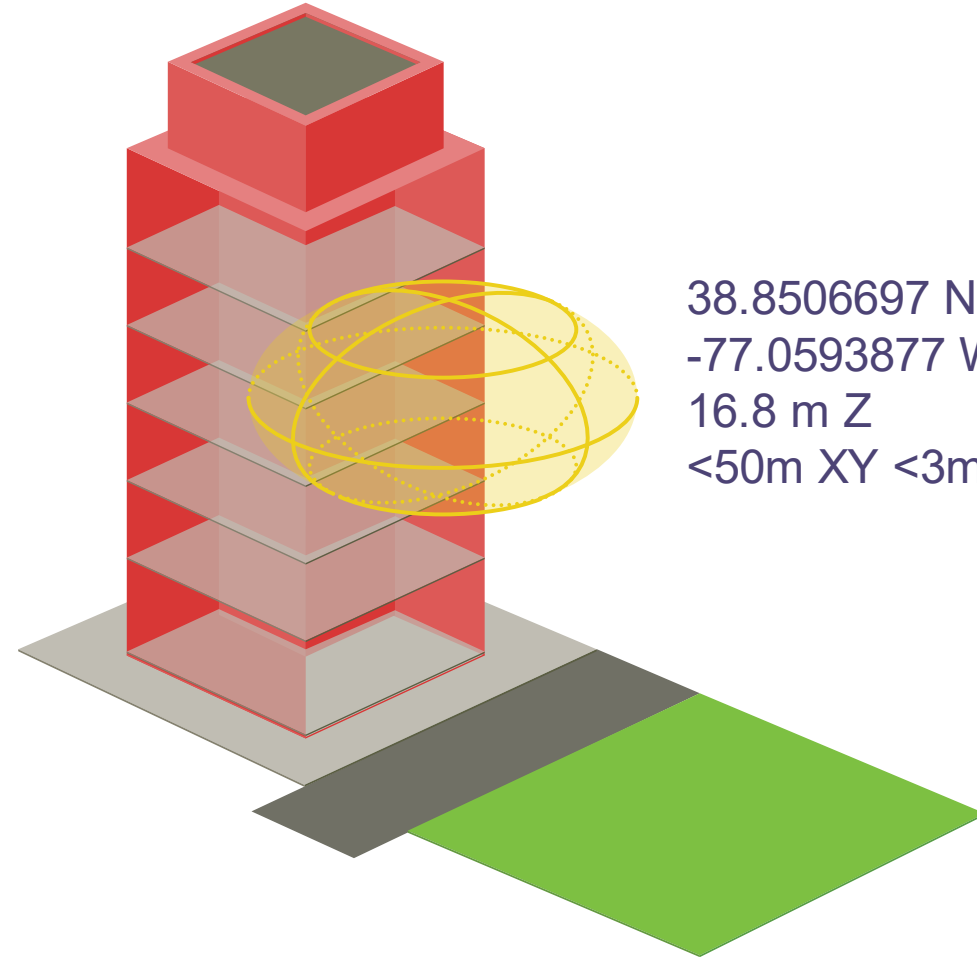




# 3D Geodetic Location With a Map



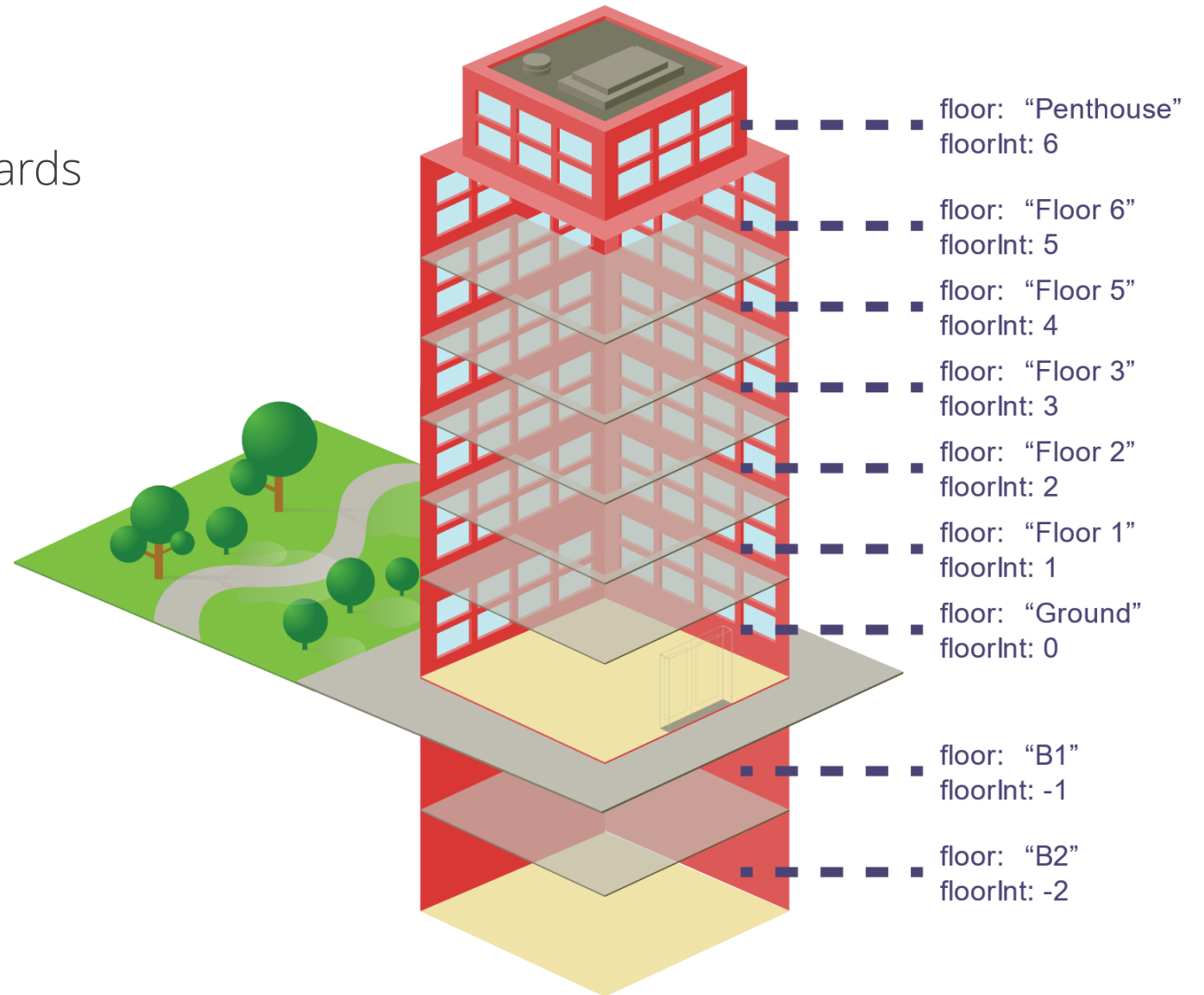
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-77.0593877 W  
16.8 m Z  
<50m XY <3m Z



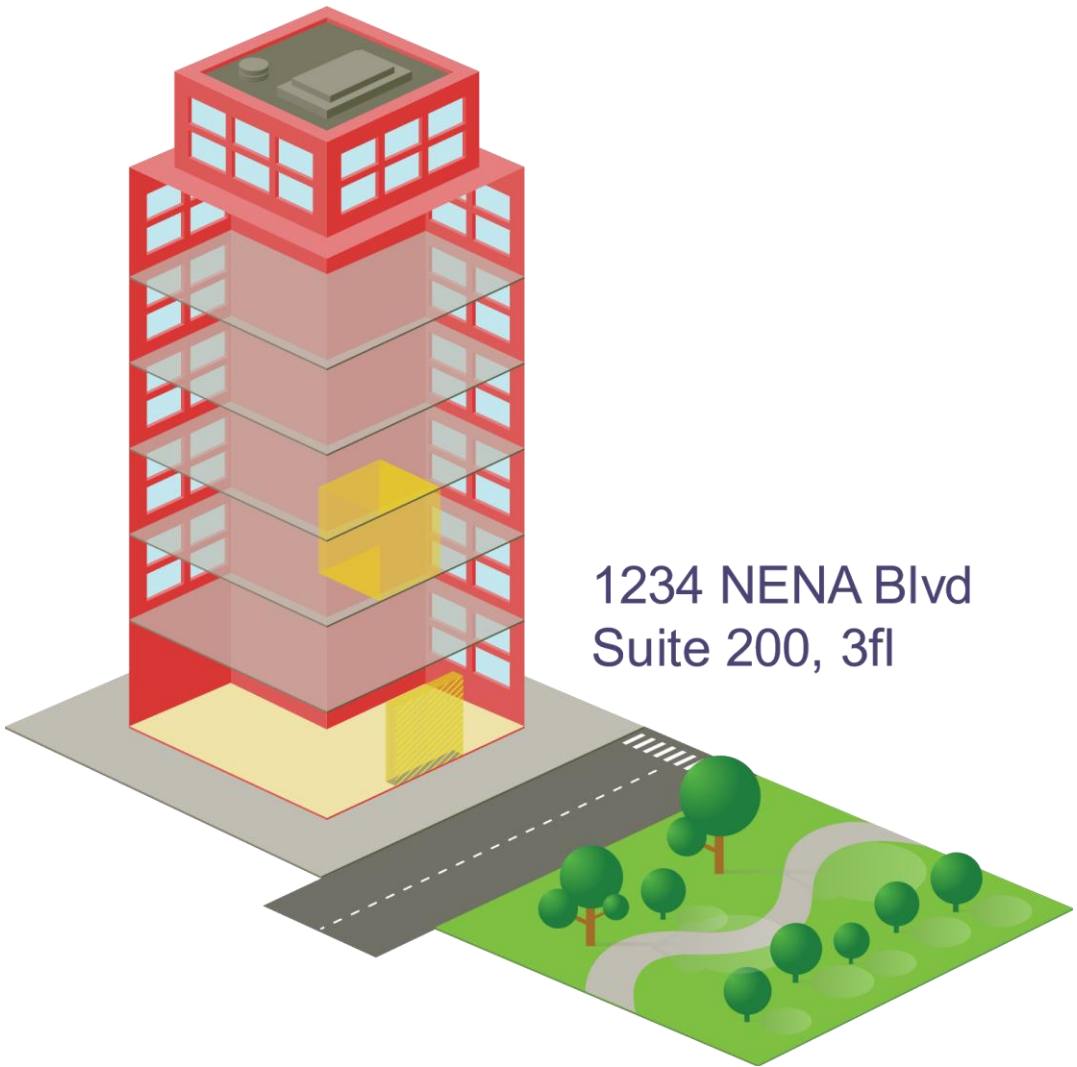
38.8506697 N  
-77.0593877 W  
16.8 m Z  
<50m XY <3m Z

# Estimating Floor Levels

- floorInt must be added to many standards that deal with location
- This allows us to use uncertainty when estimating a floor level

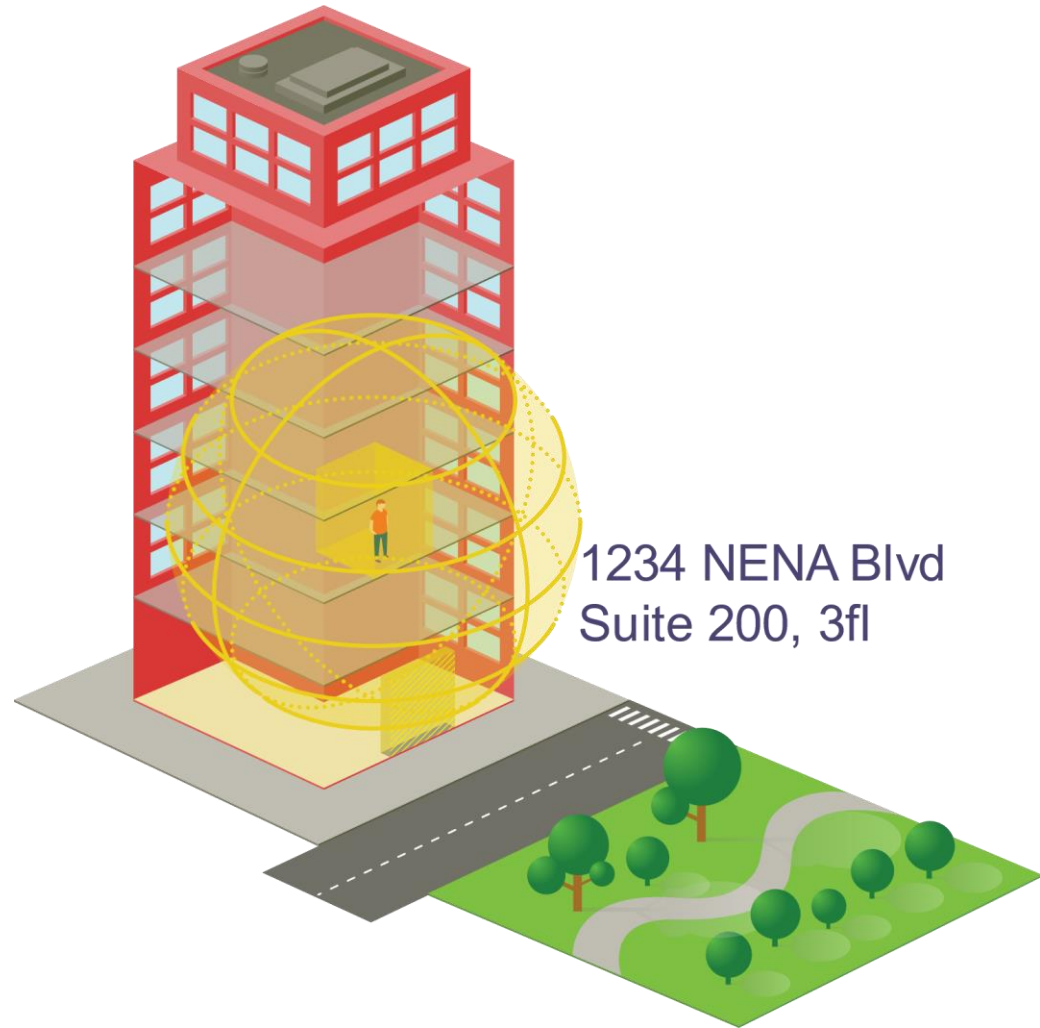


# 3D Civic Location



1234 NENA Blvd  
Suite 200, 3fl

# 3D Dispatchable Location

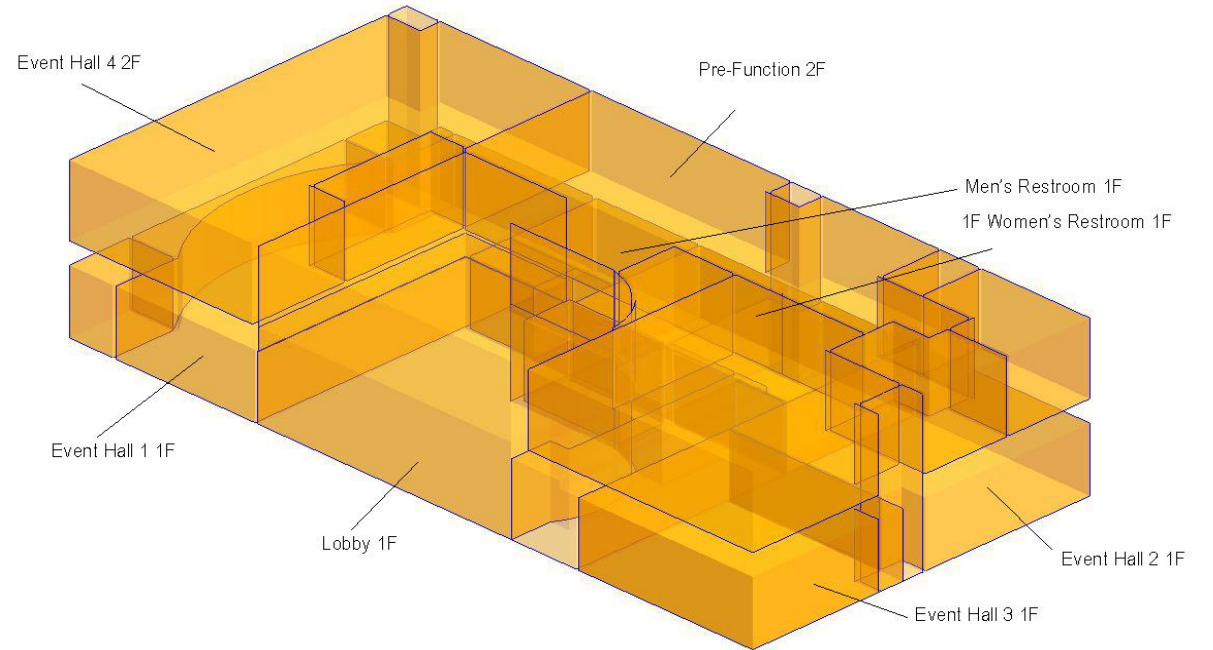
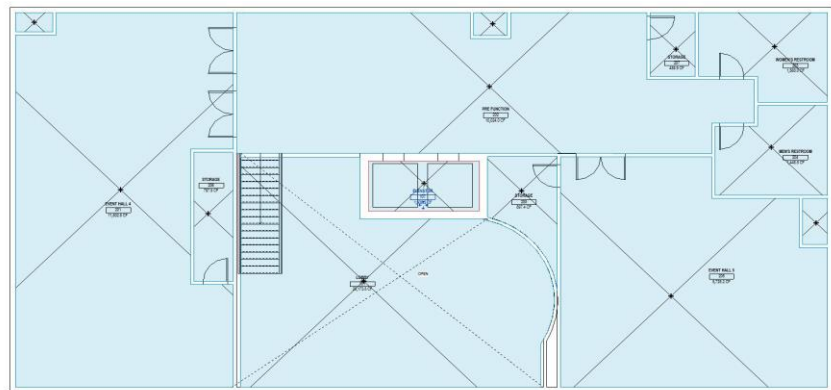
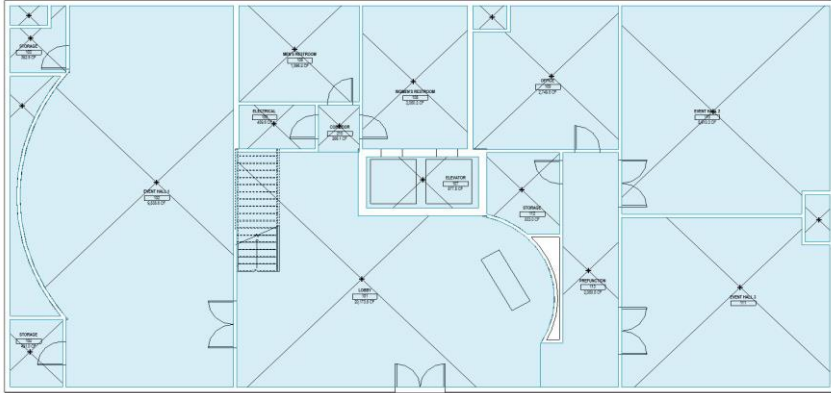


# Extrusion Using Building Footprint & Height



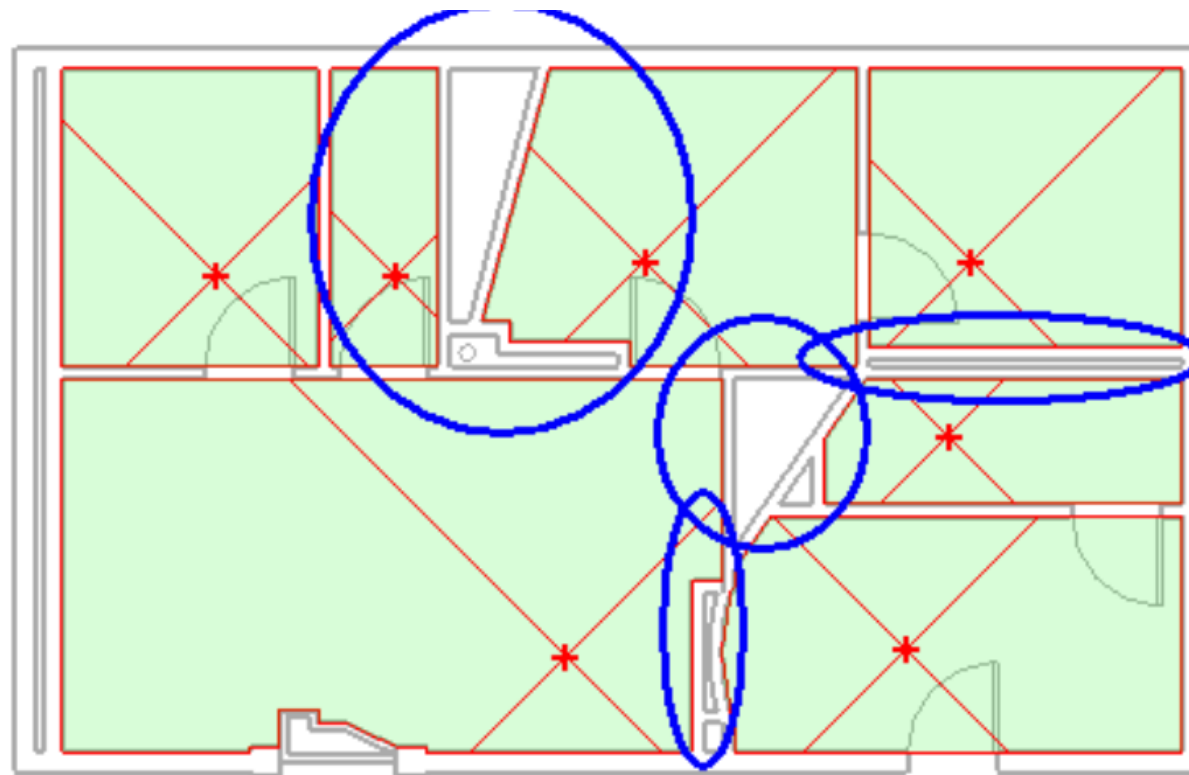
*(image from ESRI)*

# Room Layout – In 2D & 3D



# Structural Spaces

- One issue is that buildings have “structural space” that 3D map queries may resolve as the space containing a caller
- Crawlspace, HVAC, chimney, utilities, elevator shaft, etc.
- For the most part there is no concept of this in GIS and address provisioning and conveyance standards at all



*(image from Esri)*

# Other Questions?

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