



**NREL**

**Subsurface Utility Investigation  
Process**

# NREL Excavation & Surface Penetration Policies and Procedures

- Excavation Permit: Site Operations Project Management Manual
- Penetrations Permit : Lab Level Procedure
- Underground Utility Marking: Specification 331000 Site Operations Engineering/Construction

# NREL Organizational Structure for Excavations and Surface Penetrations

- Site Operations
  - Project Management Engineering and Construction
  - Building Area Engineers
- ESH
  - Safety Professionals
- SiteWise
  - Partnering Subsurface Utility Engineering (SUE) contractor

# Excavation Permit

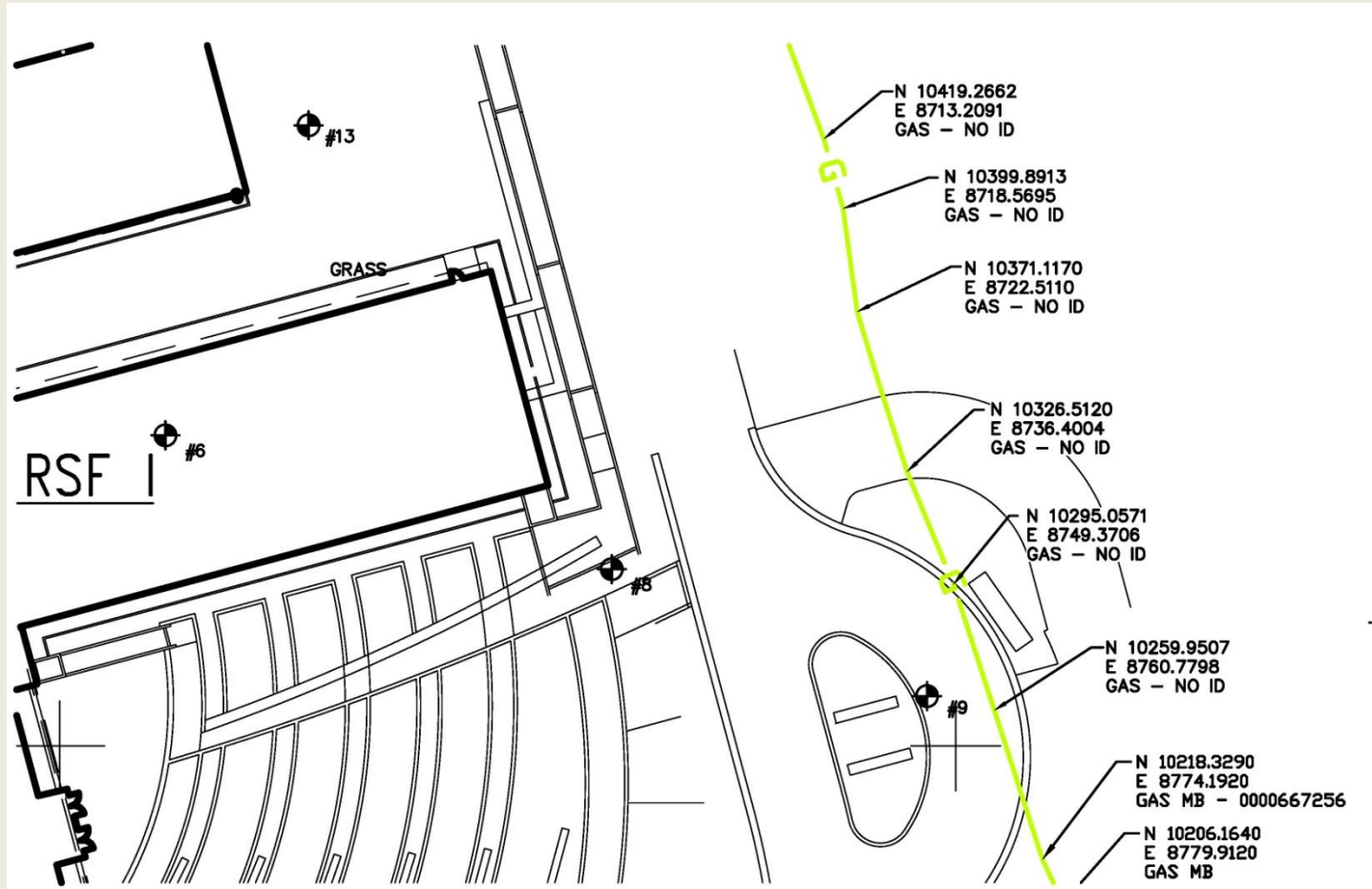
- Managed by NREL's Building Area Engineers
  - The BAE's are the only signature required on the permit to proceed with excavation
  - Do not at this time have an automated web-based permitting system as is recommended in EFCOG best practice # 78
  - Public Utility locates are coordinated through the Utility Notification Center of Colorado
    - NREL also verifies public utilities
  - Subcontractor must also have plan addressing the excavation activity

# Surface Penetration Permit

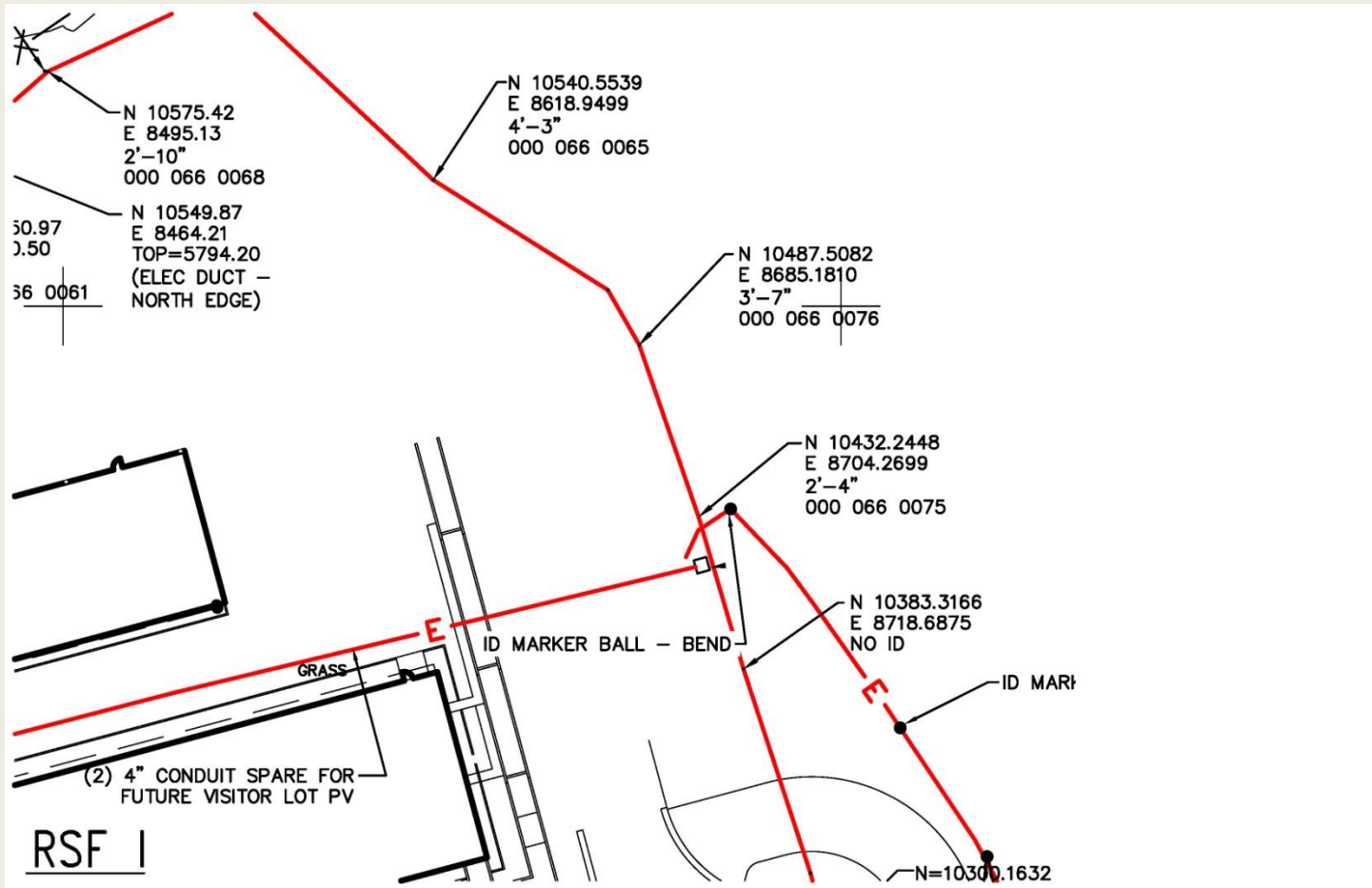
- Standard Surface Penetration Method Permit
  - Exception form
- Non-standard Surface Penetration Method Permit
  - Additional project controls such as PPE, utility locate equipment etc
- Requires ESH and PM/line manager signature as well as permit holder signature

# Underground Utility Marking Specification; NREL's marker ball program

- 3M Dynatel
- Drawings are supposed to be created for approval before installation
- As built drawings
  - challenging to show all the balls and dimension data
- Tracer wire is required on all utilities as well as marker tape per specifications



# Natural Gas Marker Balls



# Electrical Marker Balls

# NREL Excavation Process

## Subsurface Utility Engineering

- Pre-Permit
- Locates/SUE
- Configuration Management Check/Drawings/Existing Field Surveys/New construction drawings

## Permit

- Signed by BAE
- Contractor Proceeds

## Configuration Management

- Marker Ball Drawing
- Field Survey stored
- Utility Site Drawings – manual operation

# NREL's SUE Partner SiteWise

- NREL recognized that there was no way to comply with EFCOG Best Practice # 84 without outside assistance
  - SiteWise utilize a minimum of 2 or 3 complementary technologies for each locate
  - SiteWise performs each locate/survey IAW DOE best practice
    - 25% over-survey, shows existing structures, etc.
  - SiteWise and NREL utilize a shared document control/records management system
  - SiteWise provides a detailed electronic and paper report for each survey/locate request
  - SiteWise manages NREL's 3M marker ball program
  - Relies on vacujet as second form of locate

# Areas for Improvement

- Document and Configuration Management System
  - Permit Management
    - Aid in keeping track of project records and incorporation into utilities
  - CAD tools
    - Would like less reliance on manual input of GPS utility data and site utility drawings. Ideally, from field tool to CAD record drawing could be more automated
    - Methodology to better store and display CAD data such as point data & marker balls
  - Records Management
    - Would like the ability to have all field and record data more readily available in the field.???
- A better understanding of the best tools to use for applications to ensure less hits