Subsurface Utility Engineering

Putting the Engineering in SUE

Understanding ASCE 38-02

Presented by:

Cardno
Shaping the Future

SoftDig
Underground Services Inc.

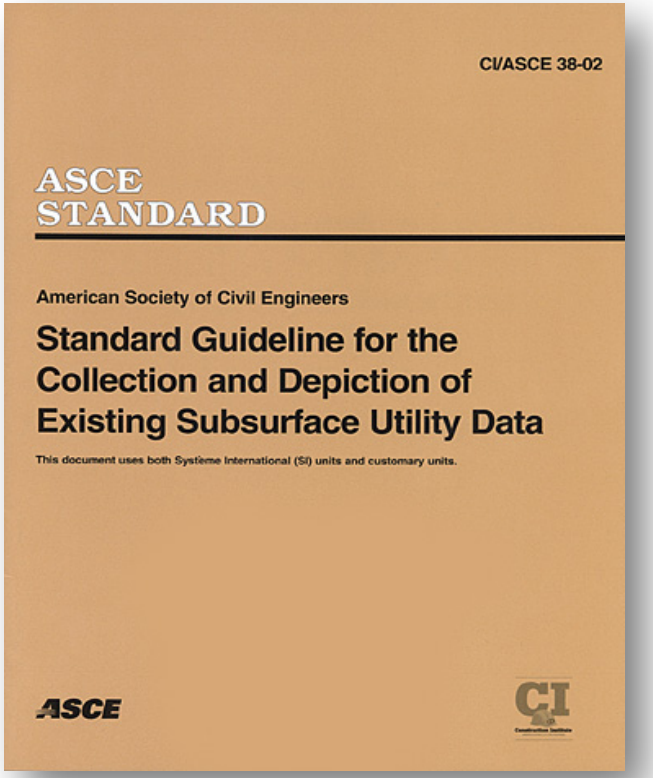
SO-DEEP Inc.

Outline

- Introductions
- Subsurface Utility Engineering (SUE) Overview
- ASCE 38-02
  - Definitions
  - Quality Levels
- How is ASCE Being Used?
- What is ASCE Doing Next?
- Questions

CI/ASCE Standard 38-02

The American Society of Civil Engineers (ASCE) has developed a National Consensus Standard, CI/ASCE 38-02, titled “Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data”. This National Consensus Standard (NCS) is used by courts and lawyers, along with contractual instruments, to assist in both defining a professional’s standard of care and level of responsibility.



What is Subsurface Utility Engineering?

ASCE 38-02 Definition of Subsurface Utility Engineering

3.0 DEFINITIONS

Subsurface Utility Engineering (SUE): A branch of engineering that involves managing certain risks associated with utility mapping at appropriate quality levels …

What is Subsurface Utility Engineering?

It is ...

- An engineering practice
- A professional engineering service
- Deliverables are signed and sealed by a PE

It is NOT...

- Survey of “Miss Utility” or One-Call Marks
- CAD File Depiction of Record Research

Definitions (from ASCE 38-02)

Designating: The process of using a geophysical method or methods to interpret the presence of a subsurface utility and to mark its approximate horizontal position (its designation) on the ground surface.

Definitions (from ASCE 38-02)

Locating: The process of exposing and recording precise vertical and horizontal location of a utility.

Minimally intrusive excavation method: A method of excavation that minimizes the potential for damage to a structure being uncovered.

Definitions (from ASCE 38-02)

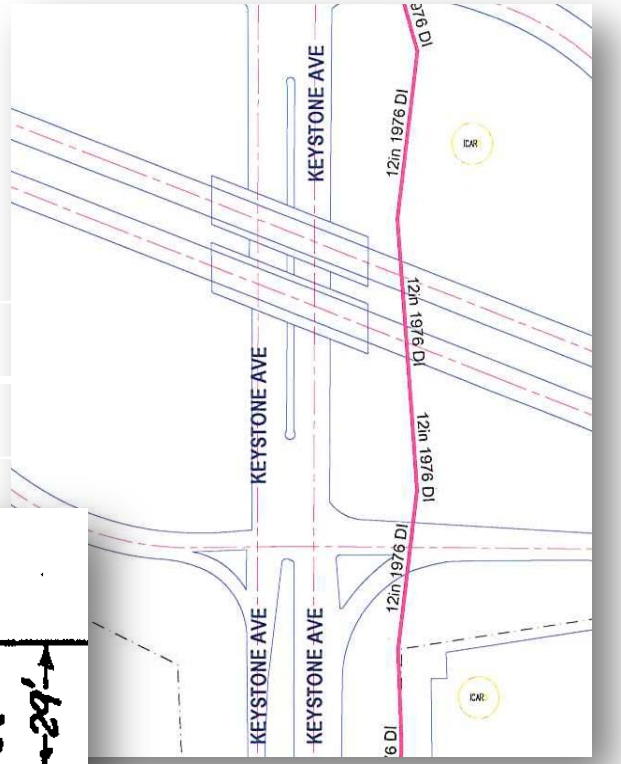
Utility Quality Level: A professional opinion of the quality and reliability of utility information. Such reliability is determined by the means and methods of the professional.

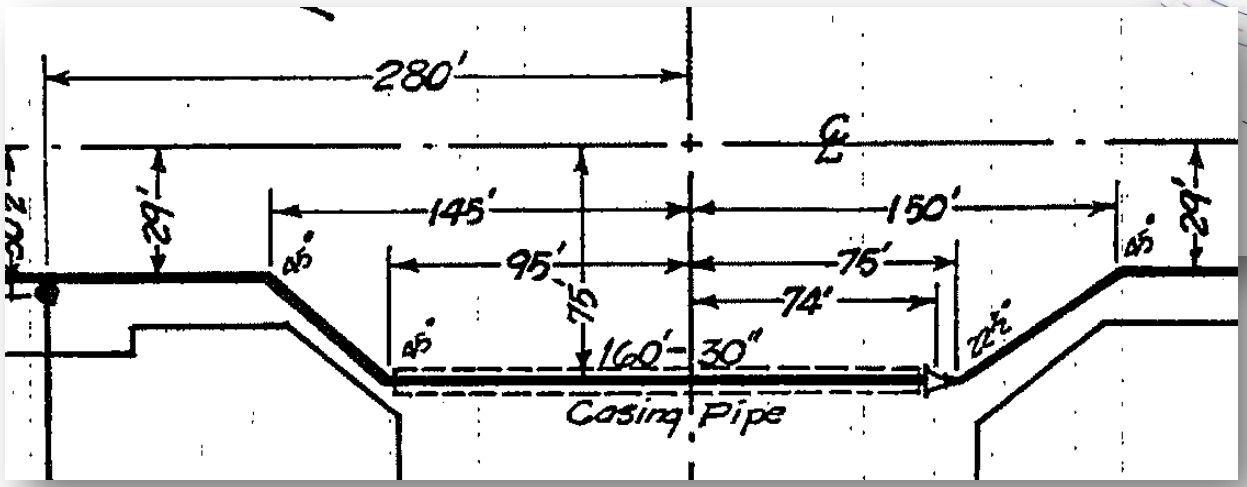
- 4 Quality Levels – QL-D, QL-C, QL-B, QL-A
- These levels must be cumulative
- Each QL is defined in the Standard

ASCE Quality Level D (QL-D)
Existing Utility Records

Information derived from existing records or oral recollections.

- > GIS Data
- > Record Drawings
- > Circuit Diagrams
- > Field Notes
- > Valve Guides
- > Mtgs. w/ Staff

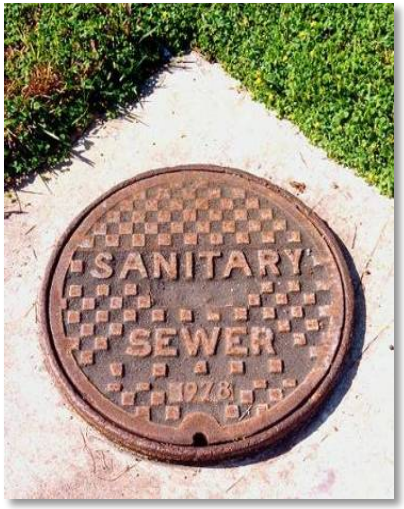




ASCE Quality Level C (QL-C)
Survey of Visible Features

Involves surveying visible above ground utility features and using professional judgment to correlate with the records (QL-D information)

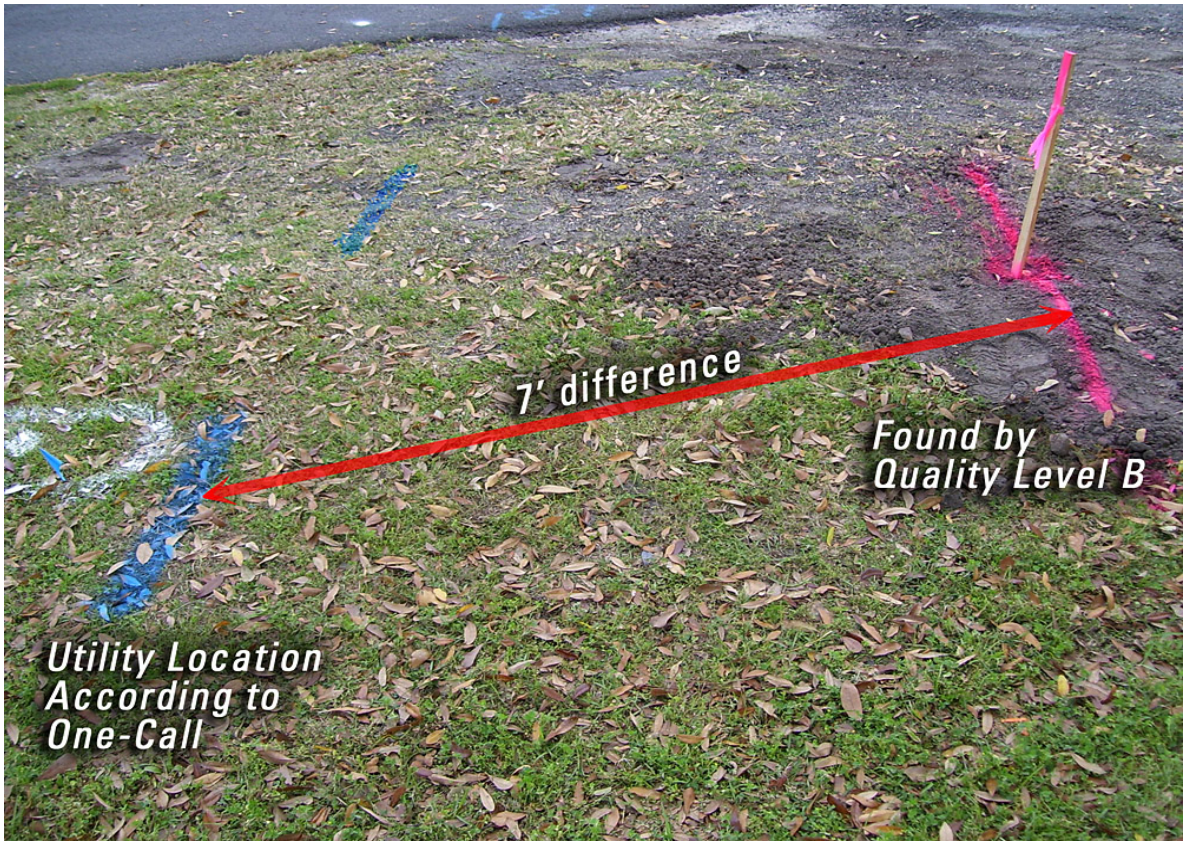
- Manholes
- Power poles
- Hydrants



ASCE Quality Level B (QL-B)
Determining Horizontal Alignment

- Obtained through appropriate surface geophysical methods
- Reproducible in the field
- Surveyed to applicable tolerances
- Included with the survey to create base mapping

Miss Utility Information is Not Quality Level-B



Why is Miss Utility Information Not Quality Level-B?

- Miss Utility is a risk based system used for excavation
- Typical Miss Utility locator uses one piece of equipment
- The information received has no guarantee of accuracy
- Miss Utility locator has a narrow focus and limited by time
- Survey of inaccurate paint marks is not QL-B

Quality Level-B is .....

- Using Appropriate Methods (Inductive vs Conductive)
  - Inductive – inducing current along utility
  - Conductive – directly connecting to utility
- Using Appropriate Equipment
  - Single or multi-frequency electromagnetic units
  - GPR
  - Sonde or sonic methods
- Supported by QL-D and QL-C
- Guaranteed by a Professional Engineer

ASCE Quality Level A (QL-A)
Utility Locating

- Precise location by actual exposure
- Minimally intrusive excavation
- Accuracy to 0.04 feet
- Supported by QL-D, QL-C, and QL-B

ASCE Quality Level A (QL-A)
Appropriate Method of Utility Locating

- Comply with permitting requirements
- Comply with Miss Utility Law
- Vacuum Excavation Systems without Production Limitations
- Work Zone Safety
- Proper Restoration

ASCE Quality Level A (QL-A) Gathering Appropriate Data

- Surveyed information
  - Horizontal and vertical location
  - Ground elevation
- Size and configuration
  - Pipe diameter
  - Width and height of ductbanks
- Resolve differences in Quality Levels
- Sign and seal with professional engineers seal *(ASCE 38-02; 4.1.12)*

ASCE Quality Level - A SUE Deliverable

Sample Test Hole Data Form

SOFTDIG #: 470040
CADD FILE: 470040TSTHLS.DGN
SHEET 1 OF 3

SoftDig®
VACUUM EXCAVATION DATA
UNITS: English

LOCATION: BOYDS CORNER INTERSECTION CONTRACT#25-041-04

CLIENT: DELDOT CITY: MIDDLETOWN COUNTY: NEW CASTLE STATE: DE

TEST HOLE	PHOTO NO.	ACTUAL SIZE, MATERIAL, TYPE OF UTILITY	OWNER	UTILITY CONDITION GOOD	UTILITY CONDITION POOR	UTILITY CONDITION OTHER	REF. MARK ELEV.	BENCHMARK REF.	TRAVERSE REF.	UTILITY TOP EL.	UTILITY BOTTOM EL.	WIDTH	NORTHING	EASTING	BASELINE STATION	OFFSET	SURFACE/DEPTH ASPHALT	SURFACE/DEPTH CONC.	GENERALIZED SOIL TYPE SOIL	SELECT FILL	ROCK	SAND	CLAY	OTHER
1 9-28-04		10" COATED STEEL GAS	EASTERN SHORE NATURAL GAS	X			PK NAIL 66.20			63.43	N/A	N/A	543285.9169	590251.8861			8"			X		X	X	
2 9-28-04		12"PVC WATER	TIDEWATER UTILITIES	X			HUB 66.19			62.85	N/A	N/A	543509.4997	590257.1039					X	X				VERY DRY AND HARD
3 9-28-04		10" COATED STEEL GAS	EASTERN SHORE NATURAL GAS	X			PK NAIL 65.87			62.46	N/A	N/A	543592.4160	590273.7724			8"			X			X	
4 9-28-04		10" COATED STEEL GAS	EASTERN SHORE NATURAL GAS	X			PK NAIL 62.85			57.62	N/A	N/A	543857.1479	590296.2558			8"			X			X	WET BOTTOM OF HOLE
5 9-27-04		12"PVC WATER	TIDEWATER UTILITIES	X			HUB 61.13			57.58	N/A	N/A	543857.9850	590286.8829					X	X				
6 9-18-04		6" PLASTIC GAS	CHESAPEAKE UTILS.	X			HUB 63.42			55.17	N/A	N/A	543882.5366	590423.9352					X				X	VERY DRY AND HARD
7 9-27-04		A) 2" DIRECT BURY CABLE TELEPHONE B) 10" COATED STEEL GAS	VERIZON ESNG	X			HUB 60.77			A) 58.35 B) 57.85	N/A	N/A	544109.9147	590307.7609					X	X		X	X	
8 9-27-04		12" PVC WATER	TIDEWATER UTILITIES	X			HUB 60.22			57.50	N/A	N/A	544113.7750	590302.9081					X	X				VERY DRY AND HARD
9 9-20-04		12" PVC WATER	TIDEWATER UTILITIES	X			HUB 61.68			58.81	N/A	N/A	544274.2936	590316.6480					X	X			X	
10 9-20-04		A) 12" PVC WATER B) 6" PLASTIC GAS	TIDEWATER UTILS. CHESAPEAKE UTILS.	X			HUB 62.42			A) 59.33 B) 56.74	N/A	N/A	544344.9421	590322.7461					X	X	X	X	X	
11 9-20-04		6" PLASTIC GAS	CHESAPEAKE UTILS.	X			HUB 62.69			58.92	N/A	N/A	544398.6951	590323.6173					X	X		X	X	
12 9-20-04		10" COATED STEEL GAS	EASTERN SHORE NATURAL GAS	X			HUB 62.90			59.10	N/A	N/A	544398.0798	590332.0086					X	X		X	X	
12A 9-20-04		12" PVC WATER IN STEEL CASING	TIDEWATER UTILITIES	X			HUB 62.93			53.69	N/A	N/A	544397.2665	590332.5839					X	X		X	X	WATER AT BOTTOM
13 9-13-04		METAL TEE FITTING WATER	TIDEWATER UTILITIES	X			HUB 62.84			58.27	N/A	N/A	544465.3660	590298.8841					X	X	X		X	
14 9-20-04		6" PLASTIC GAS	CHESAPEAKE UTILS.	X			HUB 63.16			60.81	N/A	N/A	544459.4367	590283.6479					X			X	X	VERY DRY AND HARD
15 9-24-04		6" PLASTIC GAS	CHESAPEAKE UTILS.	X			HUB 63.04			60.44	N/A	N/A	544458.0782	590207.7961					X			X	X	
16 9-19-04		12" PVC WATER	TIDEWATER UTILITIES	X			HUB 63.78			59.24	N/A	N/A	544535.1358	590311.1765					X	X			X	VERY DRY AND HARD
17 9-19-04		A) 2" DIRECT BURY CABLE TELEPHONE B) 10" COATED STEEL GAS	VERIZON EASTERN SHORE	X			HUB 64.60			A) 62.39 B) 61.07	N/A	N/A	544586.9078	590348.5479					X	X			X	VERY DRY AND HARD
18 9-26-04		12" PVC WATER	TIDEWATER UTILITIES	X			RR SPIKE 64.11			59.96	N/A	N/A	544891.8680	590337.2255					X					VERY DRY AND HARD
19 9-18-04		6" PLASTIC GAS	CHESAPEAKE UTILS.	X			HUB 61.75			57.68	N/A	N/A	544105.8663	590437.6422					X				X	VERY DRY AND HARD
20 9-18-04		6" PLASTIC GAS	CHESAPEAKE UTILS.	X			HUB 63.71			60.57	N/A	N/A	544336.6474	590460.1537					X				X	
20A 9-18-04		A) 2½" STEEL VENT PIPE B) 6" PLASTIC GAS	CHESAPEAKE UTILS.	X			HUB 62.89			A) 60.75 B) 59.45	N/A	N/A	544336.7118	590451.7295					X				X	
21 9-18-04		4" PLASTIC GAS	CHESAPEAKE UTILS.	X			HUB 65.62			62.22	N/A	N/A	544875.6166	590497.2679					X				X	VERY DRY AND HARD
22 9-26-04		12" PVC WATER	TIDEWATER UTILITIES	X			HUB 62.21			58.17	N/A	N/A	545041.6550	590345.0590					X					
23 9-19-04		10" COATED STEEL GAS	EASTERN SHORE NATURAL GAS	X			PK NAIL 64.54			60.59	N/A	N/A	545189.1562	590379.2663			8"			X			X	VERY DRY AND HARD

Underground Services, Inc.
AS TO ONLY BELOW SURFACE DIMENSIONS, CONDITIONS & UTILITY ATTRIBUTES.
William S. Richardson, P.E.,P.L.S.

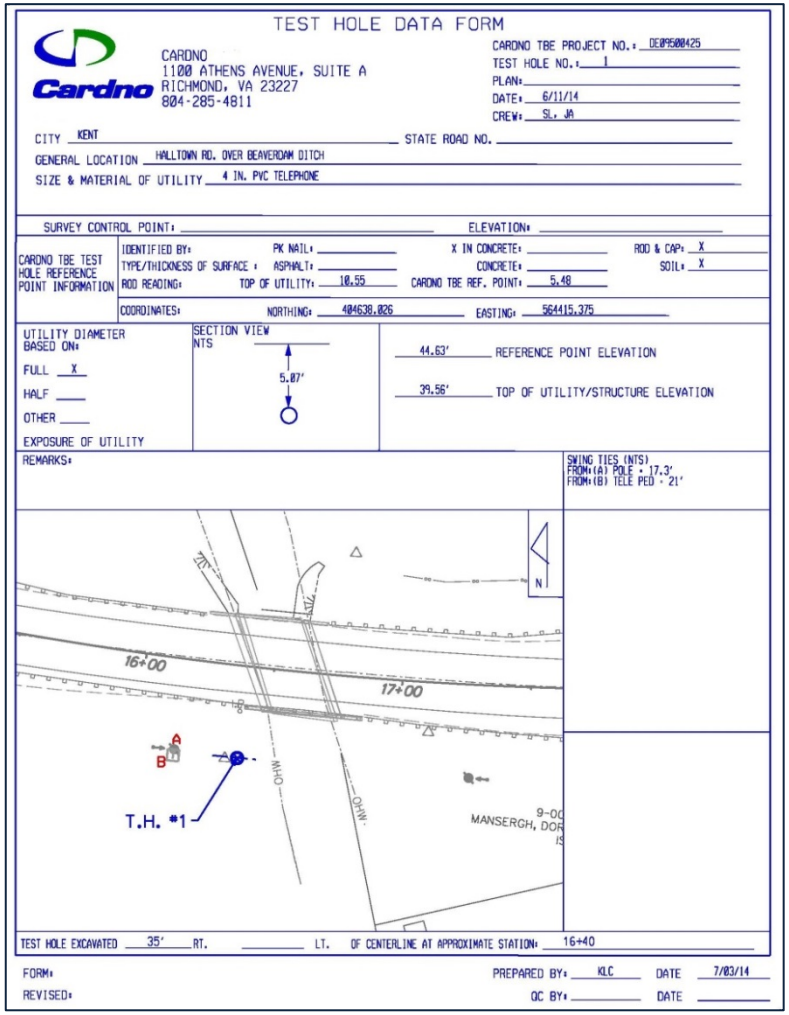
NOTES:
TH#7 
TH#10 
TH#12A COULD NOT MEASURE STEEL CASING SIZE DUE TO WATER
TH#17 
TH#20A 

Checked By: DV
Date: 10/9/04

Ramesh C.Batta Associates, P.A.
AS TO ONLY HORIZONTAL & VERTICAL LOCATION OF REFERENCE MARK.
Toland S. Van Stan Jr., P.L.S.

ASCE Quality Level - A SUE Deliverable

Sample Test Hole Data Form



TEST HOLE DATA FORM

Cardno
CARDNO
1100 ATHENS AVENUE, SUITE A
RICHMOND, VA 23227
804-285-4811

CARDNO TBE PROJECT NO.: DEMP600425
TEST HOLE NO.: 1
PLAN:
DATE: 6/11/14
CREW: SL, JA

CITY: KENT
STATE ROAD NO.:
GENERAL LOCATION: HALLTOWN RD. OVER BEAVERDAM DITCH
SIZE & MATERIAL OF UTILITY: 4 IN. PVC TELEPHONE

SURVEY CONTROL POINT:
ELEVATION:

CARDNO TBE TEST HOLE REFERENCE POINT INFORMATION
IDENTIFIED BY:
PK NAIL:
X IN CONCRETE:
ROD & CAP: X
TYPE/THICKNESS OF SURFACE: ASPHALT:
CONCRETE:
SOIL: X
ROD READING:
TOP OF UTILITY: 10.55
CARDNO TBE REF. POINT: 5.48
COORDINATES:
NORTHING: 404638.826
EASTING: 564415.375

UTILITY DIAMETER BASED ON:
FULL X
HALF
OTHER
EXPOSURE OF UTILITY

SECTION VIEW
NTS
5.07'

44.63' REFERENCE POINT ELEVATION
39.56' TOP OF UTILITY/STRUCTURE ELEVATION

REMARKS:

SWING TIES (NTS)
FROM:(A) POLE = 17.3'
FROM:(B) TELE PED = 21'

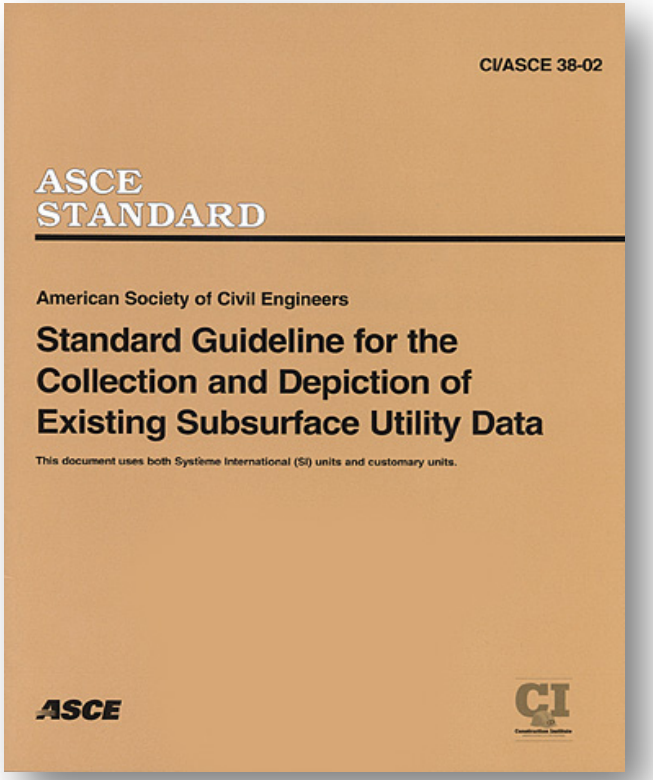
16+00
17+00
T.H. #1
MH
OHW
MANSERGH, DOR

TEST HOLE EXCAVATED 35' RT. ____ LT. OF CENTERLINE AT APPROXIMATE STATION: 16+40

FORM:
REVISED:
PREPARED BY: KLC DATE 7/03/14
QC BY: DATE

How has the ASCE 38-02 Been Used?

- Best practice (FHWA, APWA, CGA, FAA, National Academy of Science, and others)
- Case Law increasing
- JUST IN: ASCE 38 NOW INCLUDED IN EJCDC ENG. DOCS
- Update imminent



What is ASCE Doing Now?

- The Revised Standard ASCE 38
  - Utility report requirement
  - Data to be GIS compatible
  - Miss Utility to be sub QL-D
- Working with NCEES on the following:
  - Workshops with state licensing boards
  - Non-professional use of the standard
  - State boards to prosecute misuse of SUE
- ASCE is committed to keeping SUE an Engineering Practice