What Utilities Wish We Knew will begin shortly…while you wait…

WE NEED YOUR HELP!

UESI, an institute of ASCE, is conducting a survey on what utility coordination looks like nationally. Please use the QR code to participate in the survey. Thanks!

What Utilities Wish We Knew

Focusing on Communications & Electric Facilities

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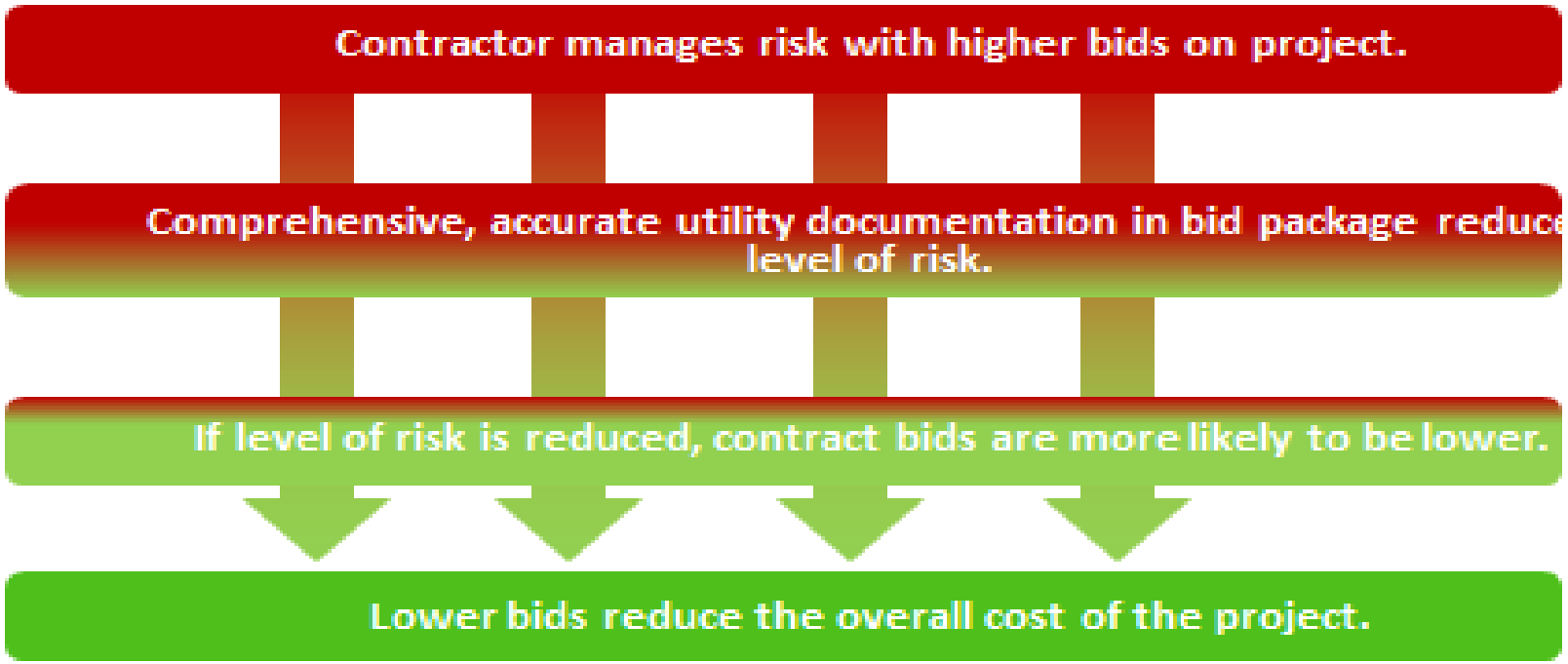
Introduction

Why should we have a better understanding about utility facilities, their needs, limitations and requirements?

It’s all about RISK MANAGEMENT…



Agenda

- Communications Facilities
- Electric Facilities
- Things to Consider
- Question & Answer

windstream

wintek
POWERED BY TIPMONT

Frontier
COMMUNICATIONS

Charter
Spectrum

Zayo

AT&T

ifn

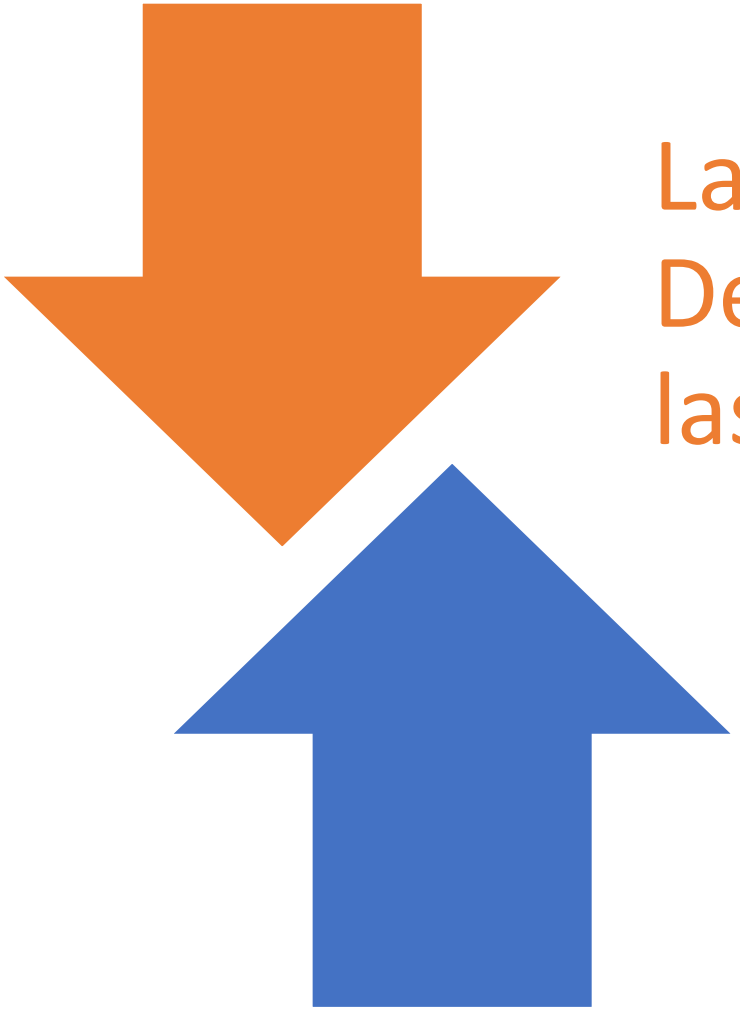
CenturyLink

METRONET
Fiber Optic Internet, TV and Phone

Sprint

COMCAST

No longer Telephone or Cable TV…
…Now Data Transmission Lines



Landline Use – Declining in the last 20 years

DSL – faster digital circuits continues to grow

Communications Facilities

- Communications companies now plan how to maintain a large amount of DATA FLOW
- Circuits involve vital links for customers like FAA, Hospitals, and Law Enforcement
- Relocation activities may require completion at NIGHT
- Relocation activities must be done in ADVANCE of road project
- Relocation activities may be limited to certain days

Deregulation Creates New Companies…And New Challenges

- Telecommunications Act of 1996 deregulated
- Created two types of carriers
  - Incumbent Local Exchange Carriers (ILEC's)
    - AT&T, Frontier, Verizon
  - Competitive Local Exchange Carriers (CLEC's)
    - Fiber Companies – Metronet, Intelligent Fiber Network, Zayo
    - Cable Companies – Comcast, Spectrum
    - Voice Over Internet Protocol, VoIP companies

Communications Facilities (1)

- ILEC's
  - Prior to deregulation – rate adjustments could be made with the IURC to account for capital spending for relocation projects
  - Deregulation requires funding to be allocated from other sources making it harder to respond to obligations under the requirements of right-of-way agreements

Communications Facilities (2)

- CLEC's
  - Generally able to respond more quickly
  - Can be limited in amount of company resources
  - Obtain confirmation of funding

Communications Facilities (3)

- Facility Relocations = Plant Upgrade
  - Existing facilities are not replaced like for like
  - New facilities sized according to current forecasted demand
  - Vacant ducts often placed for future needs
  - Funding is often available only to do required work

Communications Facilities (4)

- Pedestals, Handholes, Manholes
  - Replacing requires replacing or moving cable
  - Replacement of cable and conduit increases scope of work
  - Relocation may be required outside of project limits

Communications Facilities (5)

Abandoned vs Retired

- Abandoned – how a communication utility views the inactive facility
  - No longer have to pay taxes
  - Do not have the resources to remove large amounts of retired cable

Communications Facilities (6)

Abandoned vs Retired

- Retired – how project owners view inactive facilities
  - UAP Section 13.8 Definition
  - No pay item or scope for Road Contractor to remove facilities

Communications Facilities (7)

Abandoned vs Retired

- Address removal of retired/abandoned facilities early in project development
- Avoids construction delays

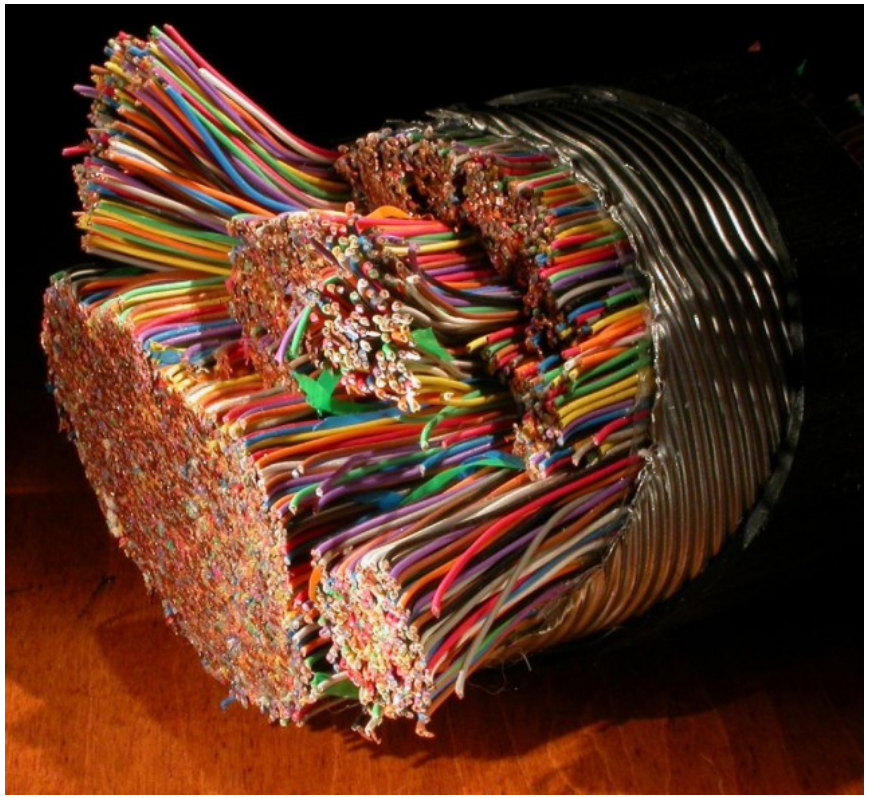
Communications Facilities (8)

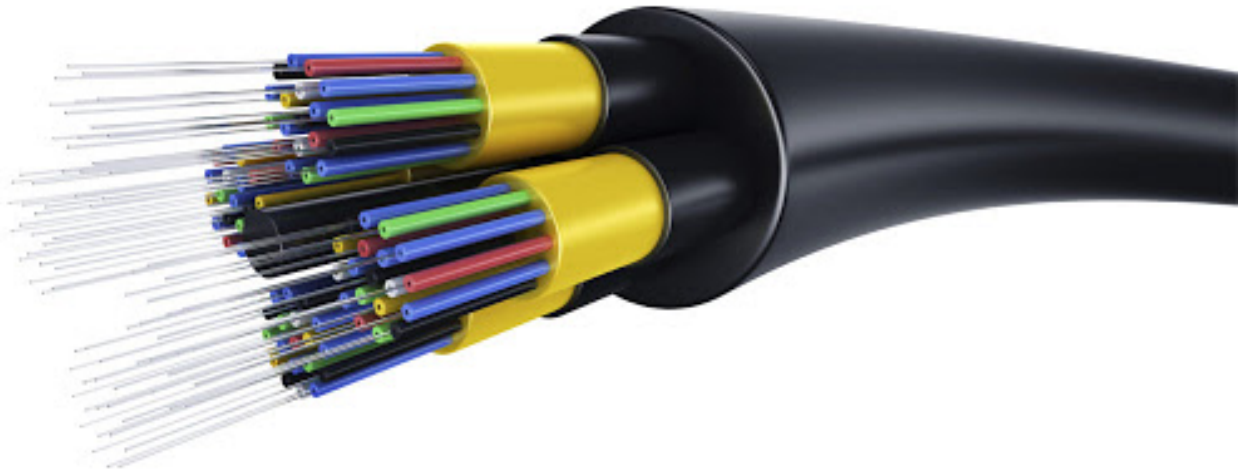
Dead and Dark

- Dead = cable in service and usable but with no customers
- Dark Fiber = cable placed in anticipation of future growth but with no current customers

Communications Facilities (9)

Copper vs Fiber





Communications Facilities (10)

Copper vs Fiber

- Copper facilities network being replaced with fiber facilities, but copper facilities will remain in service for decades
- Copper does not suffer loss of signal strength when spliced
- Fiber does not suffer distance penalties

Communications Facilities (11)

Copper vs Fiber

- Copper can be spot spliced
- Fiber is affected by the number of splices in the cable
  - Fiber must be spliced between existing splice points

Communications Facilities (12)

Copper vs Fiber

- Data circuits through copper cables are designed for specific distances
- Fiber cables are designed with frequent points with coiled cable for future splice as needed

Touchstone Energy®
Cooperatives

Electric Facilities

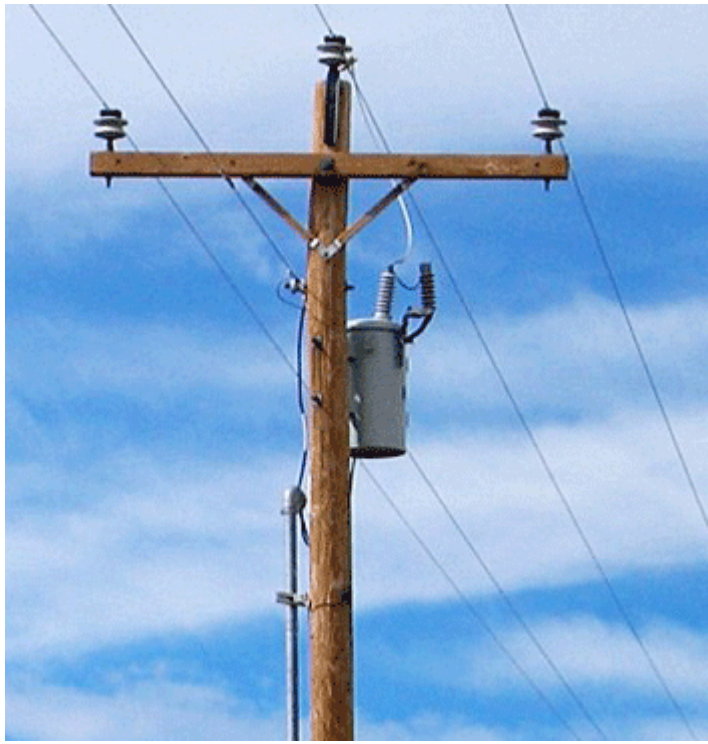
Electric Companies

- Government & Municipal Electric Companies
- REMC – Electric Cooperatives
- Investor Owned

Electric Facilities (2)

All About Poles

- Pole embedment
  - 10% + 2’ for wood
  - 10% + 4’ for steel
  - Sometimes dependent on soil conditions



Electric Facilities (3)

All About Poles

- Pole lengths
  - 25’ to 115’ in 5’ increments
  - Varies with terrain, line voltage, and number of attachments
  - Dependent on clearance requirements from other obstructions
  - Includes embedment lengths

Electric Facilities (4)

All About Poles

- Pole widths
  - Wider at bottom of pole and tapers to top
  - Pole butt typically 2’
  - Auger for pole installation typically 3’
  - From back of right-of-way to next utility should be 4’

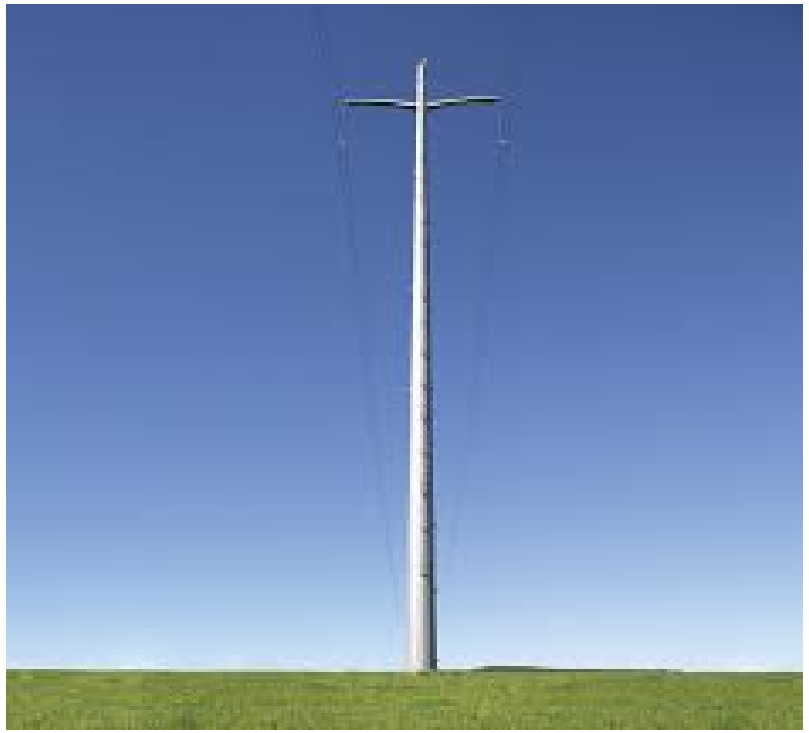
Electric Facilities (5)

All About Poles

- Line Clearances from line to line on a pole
  - Depends on voltage
  - National Electrical Safety Code
  - Rural Utilities Service
- For underbuilds – 40” minimum

Electric Facilities (6)

All About Poles



- Steel Poles
  - Direct Bury poles
    - Ground, and anchors as needed, anchors the pole
  - Self-Supporting
    - Concrete foundation anchors the pole
    - Will have 4 bolts at the base of the pole

Electric Facilities (7)

All About Poles

- Using Steel over Wood
  - Depends on stresses on pole with or without guy anchors
  - Space constraints for anchor leads
  - Environmental deterioration factors
  - Cost
  - Company policy
  - Steel are primarily used for transmission poles

Electric Facilities (8)

All About Poles

- Cutting grade around poles
  - Depends on facility and company requirements
  - 1’ of cut or greater requires a pole analysis
  - Duke allows a 2:1 ratio
- Cutting grade around poles should be avoided if possible
- Check with electric utility for Third Party Standards

Electric Facilities (9)

All About Poles

- Pole Brand
  - Company name
  - Pole height
  - Pole class
  - Sometimes type of wood
  - Sometimes year of installation

Electric Facilities (10)

All About Poles

- Pole Class
  - How fat the pole is at the base
  - The skinner the pole, the higher the number

Electric Facilities (11)

Span Lengths

- Depends on pole height and class, size of wire, number of underbuilds
- Distribution – 100’
- Secondary – 100’-120’
- Primary – max of 225’

Electric Facilities (12)

Wire

- Size of the wire does not mean voltage
- Material of wire – copper and aluminum
  - Copper is being replaced by aluminum
  - Material can cause a delay in a project schedule
- Oval wire is used when span lengths need to be longer
- Be careful of “galloping” wire –
  - Wires move up and down instead of side to side
  - Can pull poles out of the ground

Electric Facilities (13)

Anchors

- Small anchors buried approximately 5’
- Larger anchors buried approximately 7’
- Some placed at a 45 degree angle or straight up and down
- Anchor depths are dependent on soil conditions
- Anchor angles follow the angle of the down guy…not necessarily straight down.

Electric Facilities (14)

Above Ground Appurtenances

- Transformers
- Junction boxes
- Pedestals
- Street lights
- Riser pole and conduit
- Cabinets
- Switchgear

Electric Facilities (15)

Line Voltages

- Distribution – 4kV to 25kV
  - Supply power locally to the customer
- Sub-transmission – 23kV to 138kV
  - Lines between substations
- Transmission – 138kV to 765kV
  - Generating station to substation
  - Large high voltage structures
  - Lower voltages can be buried but very expensive

Electric Facilities (16)

Relocation Options

- Pole alignment
  - Maximum 2% of power line angle can be made without requiring lateral guying
  - Dependent on conductors, conduction tensions, pole height, and span length
- Burying facilities – can bury electric and communication in the same trench in different conduits

Electric Facilities (17)

Relocation Options

- De-energizing
  - Can only be done if the circuit can be back fed
  - Occurs when clearances are violated or for maintenance or emergency repairs
  - More likely to de-energize in spring and fall
  - Dependent on weather, work in surrounding areas, type of customers served (hospitals, etc), number of customers on a circuit

Electric Facilities (18)

Relocation Options

- MISO, PJM
  - MISO & PJM are regional transmission organizations that coordinate the movement of wholesale electricity
  - Voltages above 138kV require MISO/PJM approval
  - MISO = Duke, IPL, NIPSCO
  - PJM = AEP
  - Line de-energizing approval can take months

Electric Facilities (19)

Relocation Options

- Holding Poles
  - Poles can be held temporarily
  - Digger or Derrick trucks hold the pole in place
- Visibility Covers
  - Does not provide protection

Electric Facilities (20)

Relocation Options

- Underbuild Relocations
  - SPANS
    - Underbuild companies submit a request to SPANS
    - SPANS notifies them when they are able to relocate
  - Usually relocated after the electric company completes their relocation

Electric Facilities (21)

Relocation Costs

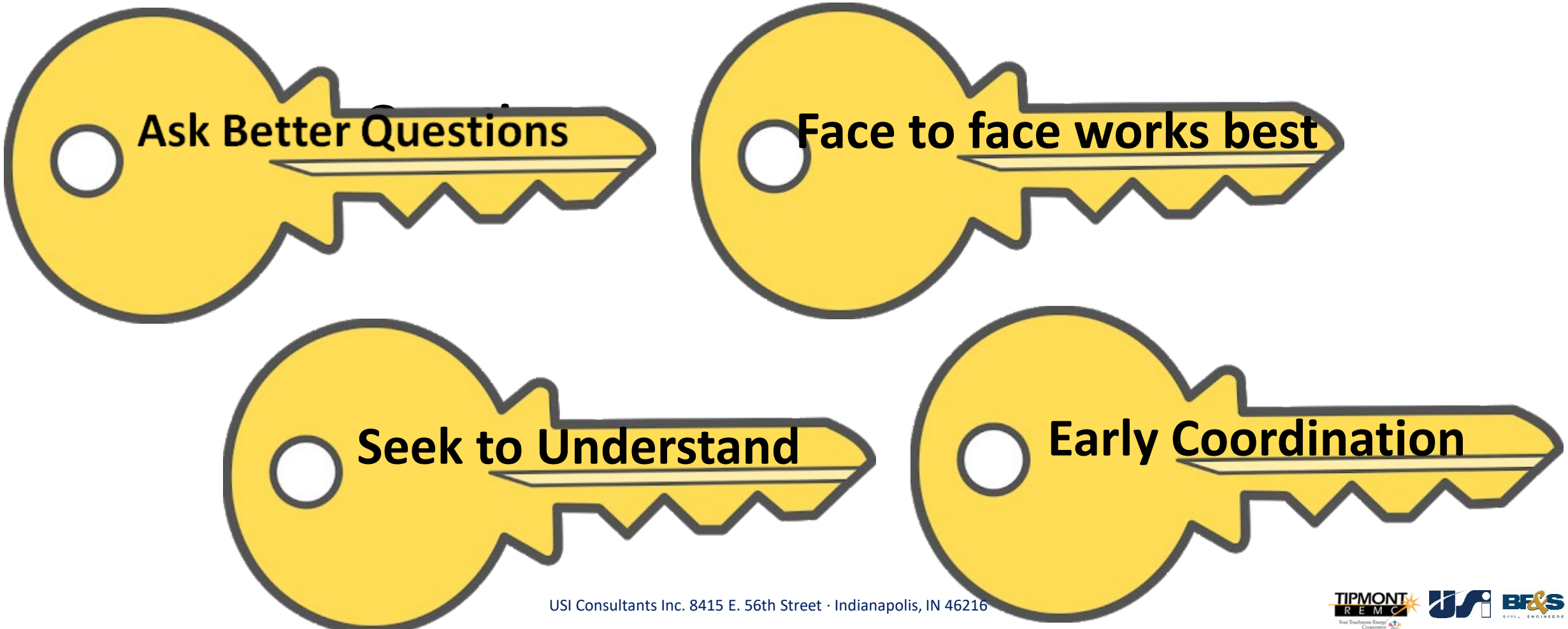
- Many factors contribute to the cost
  - One pole and conductor for distribution and subtransmission - $10k to 16 k
  - Transmission starts at $15k
  - One mile of new 3 phase distribution is approximately $160k

Electric Facilities (22)

References

- NESC – National Electric Safety Code
- OSHA – Electrical Safety

Communication & Cooperation are the keys to successful Coordination



- Data Transmission Facilities:
  - Know the material type – copper, fiber, paper wrapped and implications of each
  - Understand differences between manhole & handhole
  - Take into account the time to engineer plans
  - Consider customers on the lines and notification requirements
  - Consider material ordering
  - Check 811 frequently for new fiber installations

- Electric:
  - Placing at the right-of-way means a 4’ clearance
  - Engineering can take 6 months
  - Wire elevations fluctuate based on weather and loading
    - Engineer relocations based on NESC weather chart
    - Indiana in Zone 2
  - Don’t forget arms that may be attached to poles
  - Underbuild communication highly dependent on utility coordination process
  - Geotechnical information is critical for some decisions
  - MISO or PJM approvals take months
  - Materials ordering can take time

QUESTIONS?

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