ICNSP-2052.02
ICN Standard Practice - Outside Plant Engineering Standards and Specifications

1. **Introduction:** This document addresses the requirements for the field survey, engineering, design, and creation of Outside Plant construction drawings required for the installation, permitting and documentation of network installation.
   - **1.1. Purpose:** Define the requirements for construction designs.
   - **1.2. Revision History:**
     - 1.2.1. Version: 2.0
     - 1.2.2. Release Date: 2018-11-15
     - 1.2.3. Summary of Changes: Revision
     - 1.2.4. Author: Tim Flickinger
     - 1.2.5. Subject Matter Experts: Tim Flickinger, Dave Augspurger, Mike Broderick
   - **1.3. Effective Date: 2018-11-15**
   - **1.4. Reason for Issues:** Revisions
   - **1.5. Areas Affected:** ICN Outside Plant, ICN Engineering, Engineering Vendors
   - **1.6. Acronymns/Definitions:**
2. **Engineering Field Survey (pre-engineering) Activities:** The goal of the initial field survey is to perform an onsite review to determine the route to be engineered, confirm building entrances if to a new site, determine more accurate footages for construction types in order to develop an accurate estimate and provide the information needed to move on to full OSP engineering activities if approved.
   - 2.1. The proposed cable route should be pre-surveyed to determine the conditions that may be encountered in the cable placing operation. The following factors should be considered.
     - 2.1.1. Safety
     - 2.1.2. Ease of construction for buried routes.
     - 2.1.3. Look at proposed bore footages to plow footages. This will impact pricing and costs.
     - 2.1.4. Review any non-typical situations (aerial or buried) that may require special attention in the engineering process.
     - 2.1.5. Handhole locations.
     - 2.1.6. Correct bonding and grounding of buried facilities and where this can be accomplished.
     - 2.1.7. Clearing and Grubbing.
     - 2.1.8. Where to place slack loops of cable, aerial or underground, for required splice points, future splice points or maintenance.
     - 2.1.9. Rearrangement of existing plant.
     - 2.1.10. Other utilities that could impact ease of construction.
   - 2.2. A placing plan giving close attention to the routine details of route preparation prior to construction is necessary. Consideration should be given to splice locations, handhole placement, points of access to the right-of-way, additional cable needed to access a splicing vehicle, etc.
   - 2.3. When selecting an underground optical cable route, the following factors should be given special consideration and discussed with the permitting authority and ICN Engineering.
     - 2.3.1. Diversity requirements known to existing ICN underground routes that may be in the area. May or may not be an individual project requirement.
     - 2.3.2. Future municipal, state, or federal improvement programs.
     - 2.3.3. Establishing the known public right-of-way.
     - 2.3.4. Avoid railroad or private right-of-way that may have re-occurring easement fees.
   - 2.4. The following items shall be provided upon completion of a field survey:
     - 2.4.1. Scope of Work Summary:
       - 2.4.1.1. Access Point location – connection point to the ICN network
       - 2.4.1.2. End Point location – site being serviced by the ICN network.

2.4.1.3. Splice points to be accessed.
2.4.1.4. Summary of field notes and contact information for sites, permit authorities, etc.
2.4.1.5. Types of construction (bore, plow, etc.) required to produce an estimate.
2.4.2. Overview Map of the route selected with locations of plow and bore methods with footages (or other construction methods as required), handhole locations, points of connection, and notes on unusual circumstances. Include route pictures and pictures of tie in points to existing network.
2.4.3. If constructing into a new site (access point or end point):
2.4.3.1. Entrance location determined.
2.4.3.2. Room location in building; suite ID, room number, located on exterior wall, etc.
2.4.3.3. Interior installation requirement.
2.4.3.4. Pictures of the building entrance, interior routing to room, room layout and location of where to terminate cable. To be included on final engineering design.
2.4.4. Permit Authority contacts or information gathered during field survey.
2.4.5. Are there any third party cable providers that could provide the fiber route?

3. **Engineering Plans and Specifications:** The following provides the specifications for performing field engineering and plan drawings on projects across the State of Iowa for new construction, relocations, etc. The goal is to have a finished engineering design for the construction of new cable plant and provide all information necessary for construction, material ordering, future maintenance and permitting upon completion of the design.
3.1. The engineering plan set will contain the following drawings with an approved ICN title block for every page:
3.1.1. Cover Page: Overview map of location, project name, project number, etc. Cover page will reference ICN construction and installation standards.
3.1.2. Key Map: For large projects that contains many plan sheets.
3.1.3. Engineering Plan sheets. Scaled appropriately to the level of detail required for various areas; rural, suburban, urban, etc.
3.1.4. Plan Sheets with pictures depicting the installations; especially interior building designs and building entrance locations.
3.1.5. Plan sheet with construction methods and quantities, total for each item, and a bill of materials with quantities.
3.1.6. All engineering plans will be formatted for 11X17.
3.2. The following information is required on all engineering design/drawings:
3.2.1. Addresses: New build only. Correct or appended street names (indicate if it is a county highway or a state highway that would require an additional permit).
3.2.2. Names of complexes for Government and Commercial buildings.
3.2.3. Station and milepost information for Department of Transportation (DOT) permits.
3.2.4. Completion of one railroad detail for each crossing on railroad detail forms (ALL information MUST be filled out!).
3.2.5. Ownership of railroads that are crossed.
3.2.6. City and state boundary.
3.2.7. Names of creeks, streams, rivers, and lakes.
3.2.8. Right-of-Way (ROW) information where required and on all underground areas.
3.2.9. Section, range and township and each drawing and the breaks between them.
3.2.10. The field engineer will gather all pertinent information necessary to install the cable system. This will include all information necessary to submit permits to the various authorities.
3.3. All drawings must be CLEAR, CONCISE, and LEGIBLE.
3.3.1. ICN requires that all drawings be done in an AutoCAD format version 2013 or newer.
3.3.2. Drawing will be delivered to the ICN in both AutoCAD and pdf formats for final engineering submittal.
3.3.3. Templates must be used for all symbols and lines.
3.3.4. Any drawing received that has not been drawn with a template/legend will not be accepted.

3.3.5. All information must be put on a base map in a professional and conscientious manner.
3.3.6. All numbers must be uniform, legible and properly positioned.
3.3.7. It is also very important that the match points are easily identifiable for the drafters.
3.3.8. Poor quality maps will not be accepted

3.4. All drawings are to be scaled as appropriate for the level of detailed required to accurately depict the route and provide clarity. The following can be used as guidelines:
3.4.1. Rural: 1" = 100'
3.4.2. Suburban: 1" = 100' or less
3.4.3. Urban or Downtown: 1" = 50' or less.
3.4.4. Congested areas should be scaled as required to provide the necessary detail required for the project.

3.5. Each set of link drawings shall read from left to right. That is, when the major direction of the link is east/west, the left side or edge of a drawing will show the match line for a more westerly/lower numbered drawing. When the major direction of the link is north/south, the left side or edge of a drawing will show the match line for a more southerly/lower numbered drawing. Match lines shall be labeled for multiple pages.

3.6. All maps must have the streets properly labeled.
3.6.1. This includes spelling, identifying state and county roads, and prefixes and suffixes.
3.6.2. State roads may be labeled as follows: IA-101, US-34, I-35, or IA-92/Main Avenue.
3.6.3. County roads should be labeled in the following manner: (Polk County) East l4th Street, or Warren County Road CR-46/University Avenue NW.
3.6.4. This will become extremely vital when it comes to issuing permits.

3.7. State highways have two ways of indicating exact locations along the highway. These are done with mile posts and/or stations. The State may require one or both for permitting. At a minimum the following information must be obtained:
3.7.1.1. Stations and mile posts at the beginning and end of each state road.
3.7.1.2. A minimum of two stations per map of any run within the state right-of-way that covers the entire map.
3.7.1.3. Stations must be obtained for each of the following: road crossings.
3.7.1.4. Right-of-way information and stations at all right-of-way changes shall be indicated.
3.7.1.5. Offsets from centerline to proposed cable location.

3.8. Although most base maps will have all street names, it is the field engineers' responsibility to ensure that all streets on all maps have the correct street/highway names indicated. This is particularly important when trying to ensure that all permits are properly issued. It is also the field engineer's responsibility to correct all errors on the base map. This includes but is not limited to adding streets and alleys.

3.9. Survey Services: Provide surveying services, or subcontract as required, in order to identify and stake ROW, proposed facility alignment or other features as required as directed by the ICN.

4. **Performance of the Field Engineering/Site Visit:** All information drawn on the maps should be drafted as close to what exists in the field as is possible. This will include, but is not limited to the following:
4.1.1. All railroads (RR) should be labeled as to the owner, i.e. Union Pacific RR, Burlington Northern, etc.
4.1.2. All railroad crossings require a railroad detail to be completed. ICN has blank forms that must be used or Engineer can provide the form with all required information.
4.1.3. Reference this detail drawing on the plan sheet by the following statement pointing to the crossing. As an example on map 9876-123 the note should read 'Railroad detail on map 9876-123A".
4.1.4. Subsequent details for the same drawing will be labeled B, C, etc.

4.2. City boundaries will be drawn on the map in the proper location. These must be the approved boundaries and not taken from general maps.

4.3. Customer sites will be indicated by the proper symbol, with the building shape resembling the actual building. The customer name and address will be written next to the building.

4.4. Governmental buildings should be properly identified by the name; i.e. city hall, county

court house, federal building, etc.

4.5. All footages will be placed parallel to, and in the center of each section.

4.6. Any footages that are “Not to Scale” (NTS) shall be labeled as such on the drawings.

5. **Underground Engineering Design Specifics:**

5.1. Stations/footages will be included at:

5.1.1. Beginning and end of all bores;

5.1.2. Change in construction methods; bore to plow to trench.

5.1.3. turns in the trench/bore/plow;

5.1.4. future pedestals,

5.1.5. hand holes,manholes or vaults.

5.1.6. Centerline of roadways, drives and entrance, etc.

5.1.7. Centerline of rivers, streams or creeks and beginning and end of bridges.

5.1.8. Existing facilities or other utilities along route; i.e. fire hydrants, cabinets, pedestals, etc.

5.1.9. Other locations as may be determined or requested.

5.2. Underground trench routing will include the distance from the edge of the road, center of the road, or back of the curb to the trench and to the edge of the right-of-way.

5.3. Cable running line will be labeled as: direct buried with cable size and number of cables. underground with size and number of conduits and cable size and number of cables.

5.4. All above ground obstacles are to be shown; i.e., transformer, gas valve, etc. with a station call out.

5.5. Placement of locate pedestals should be called out with type of pedestal to be placed.

5.6. Placement of handhole, manhole or vaults with type of structure to be placed, size, and quantity of slack to be left at each location.

5.7. Offset (in feet) cable running line to existing ROW, centerline or other fixed facility in the ROW.

5.8. Offsets to location of handholes, manholes or vaults.

5.9. Show all above ground structures with respect to centerline or curb to front of structure, i.e. pedestals, vaults, transformers, etc.

5.10. Show all known underground utilities.

5.11. Show right-of-way with respect to centerline or curb.

5.12. Show all existing manholes, pedestals, and vaults (all above ground utility structures).

5.13. Show depth of proposed cables (36" to 48” is normal for ICN).

5.14. Show proposed underground location with respect to centerline or curb.

5.15. Show proposed vaults, splice pedestals, and manholes.

5.16. Show proposed building entrances.

5.17. Show all existing ICN building entrances.

5.18. Completed information will be provided in such a manner as to facilitate obtaining the necessary permits in a timely manner.

6. Other OSP Engineering Responsibilities:

6.1. Obtain requirements for underground construction from all related governing bodies; i.e. depth and distance from ROW.

6.2. Obtain all necessary contact information for obtaining underground utility locations of existing utilities.

6.3. Determine if hiring an underground utility locator will be required for project engineering as determined by the local ROW authority.

6.4. Determine if route has any planned construction by the city, state, or county that would affect proposed construction; i.e. any planned road re-construction within the next 5 years. Also, determine if there is anything that the governing body will require that might impede our progress; i.e. franchise requirements, excessive fees, etc.

6.5. Obtain necessary form(s) for filing of permits.

6.6. Prepare permits for submittal by the ICN.

7. **References:**

7.1. ICNSP 2051.02 - ICN Standard Practice for As Built Drawings Standards and Specification.

7.2. ICNSP 2051A – Appendix A to As Built Drawing Standards