DOCUMENTATION OF CABLE RACKING AND CABLE ARRANGEMENTS IN MANHOLES (MANHOLE DIAGRAMMING)

Contents

1. GENERAL

1.01 This appendix supplements Section 632-305-215.

1.02 It is reissued to:

- Reflect changes due to advances made in the modular splicing concept.
- Revise section title.
- Provide procedures for diagramming of manholes to allow Construction and Engineering forces to fulfill their joint responsibilities for full utilization of manholes and associated conduit.

Note: Marginal arrows used to denote changes are omitted.

A. Purpose

1.03 Procedures in this appendix provide for the orderly accumulation and documentation of internal manhole data (manhole diagrams) pertinent to underground cable design and construction. The need for manhole diagrams is emphasized by today's high cost of manhole construction and substructure congestion in many underground feeder routes. With the advent of Connectorized Exchange Cable Splicing System (CONECS), information such as duct assignment, splice racking position and duct entrance distance becomes critical and requires disciplined documentation. These items become a fixed part of the job design and cannot be changed once the material has been ordered. Furthermore, considerable material cost savings can be realized through a combination of accurate internal manhole measurements and wall-to-wall distances. The implementation and maintenance of manhole diagrams can greatly contribute to the full use of existing conduit and manhole structures with inherent long term cost savings.

1.04 Not all manholes have to be diagrammed. Local policy will determine which manholes to diagram. Cost effectiveness, type of manhole (straight or junction), timeliness, and manhole congestion should be considered when determining manhole diagramming policy. However, the recommended procedure is to diagram all manholes.

B. Scope

1.05 The Manhole Diagram Form, CF 0068, (Exhibit 1) is an administrative plant record and is maintained by and filed in the Engineering Location Records Unit. Form CF 0068 is only available on mylar in one record master size, 22- by 28-inches. All manhole diagrams will ultimately be drafted and maintained on Form CF 0068. They may be reduced for Engineering and Maintenance groups to make them easier to handle and file.

(a) Most Engineering Districts have manholes diagrammed on Form CO 4553, Loose Leaf Duct Record. On an as needed basis the information on Form CO 4553 will be transferred to Form CF 0068.

(b) Where manholes have not been verified or diagrammed, it is recommended that Form CO 4553 be sent to construction for the initial rough field diagramming. This form is simply a schematic layout of the manhole interior and is available in three versions:

- CO 4553 — 8 1/2- by 11-inches; suitable for most manholes up to 6-feet wide by 12-feet long.
- CO 4553-1 (Manhole Detail) — 11- by 17-inches; used for large manholes.
- CO 4553-2 (Center Rack Manhole Detail) — 11- by 17-inches; used for large center rack type manholes.

Notes:

1. For odd shaped manholes or other unique situations, the engineer will provide a larger size form than the CO 4553 for Construction to accomplish the rough diagramming of the manhole.
2. While it is acceptable to use Form CO 4553 for the initial rough fielding and diagramming of manholes by Construction, ***ONLY*** Form CF 0068 will be used for the record master manhole diagram.
3. After a master CF 0068 manhole diagram has been established for a manhole, Form CO 4553 will not be used again in connection with that manhole. The Engineer will use copies of Form CF 0068 for all future corrections and additions or rearrangements.

1.06 The availability and accuracy of this information will greatly influence the degree of success to be experienced with preconnectorized cable. It should be emphasized here that this procedure is ***not*** restricted to underground CONECS-type jobs. To make manhole diagrams a usable tool, all estimates or routine orders involving the placement, removal, or rearrangement of any plant within a manhole should include a copy of Form CF 0068 to be updated and issued with the final working drawings.

1.07 In addition to providing specific job related information, manhole diagrams will also provide a planning tool for the Distribution Services Engineer (DSE) and a working tool for the Cable Maintenance forces and construction forces.

1.08 Manhole diagrams provide the DSE with a schematic picture of each manhole. This is an invaluable aid in the design of a proposed job and the long-range planning of a route. It clearly depicts the physical constraints within the manholes. Manholes nearing congestion can be identified and the necessary steps taken to alleviate the problem before it becomes acute. If a manhole is already congested, the CF 0068 form can be used to develop a planned solution. Most importantly, it provides a method for monitoring duct availability and splice racking space. Without manhole diagrams, the DSE could only obtain this information by a visit to the manhole(s). Except for extreme cases, a review of the CF 0068 will yield the same information, resulting in considerable engineering time saved.

1.09 There are also benefits in manhole diagrams for the Cable Maintenance forces. When time is of the essence, information provided on the CF 0068 can be extremely helpful. Knowledge of manhole conditions (such as a lead sleeve, a restrict-

ed splice, etc), can assist in dispatching the properly trained personnel with the proper tools.

Note: A copy of the CF 0068 will be filed in the Cable Maintenance dispatch center.

1.10 Most of the information entered on the CF 0068 must be obtained through an inspection of the manhole(s). Due to the nature of this information, this fielding process should be conducted by a qualified technician(s). It is recommended that the technician(s) be under the supervision of the Modular Splicing Coordinator Construction (MSCC) or a responsible management person appointed by the district who is responsible for the accuracy of the manhole diagramming.

Notes:

1. The MSCC is a management person who is responsible for manhole diagramming accuracy which includes CONECS decisions and preparation of cable ordering forms.

2. Manhole diagrams are an administrative plant engineering record and will require that all plants be documented by the technician. There is no way to identify a partially diagrammed manhole which will ultimately result in duplication of effort and added engineering costs.

3. Consideration shall be given to partial diagramming, minimum one wall, for large manholes with reduced potential for future activity.

1.11 Under certain conditions, it may be advantageous to have the manhole diagramming done by an outside contractor. In most cases this would be done at the direction of the Modular Splicing Coordinator Engineering (MSCE) or a responsible Engineer appointed by the district and under the supervision of the MSCC. Due to the cost involved, a decision to contract manhole diagramming should be made with the concurrence of the District Engineering Manager.

2. RESPONSIBILITIES

A. General

2.01 It is the responsibility of the DSE or MSCE to initiate the manhole diagramming. The technician, at the direction of the MSCC, makes recommendations on cable racking, splice bay assignments and verified duct assignments. The MSCC will be charged with the responsibility for the accuracy, completeness and reasonableness of these recommendations. The DSE is charged with overall responsibility for proper utilization of the conduit and manhole structure.

Note: A modular splicing coordinator (Engineering or Construction) may not be required for each District. Designating a specific person as the Modular Splicing Coordinator is optional within each Engineering and Construction District. An alternative is to make each Engineer responsible for manhole diagrams in conjunction with his/her specific jobs.

B. Distribution Services Engineering

2.02 The Distribution Services Engineering forces will be responsible for preparation and maintenance of the master copy of all CF 0068s. The master copy is to be posted by and retained in the Engineering Location Records unit. Paper copies are made from the masters and filed in the appropriate Engineering and Maintenance offices.

Note: Master copies of the CF 0068(s) can be filed by any method (route, numerical order, etc) but it should be consistent within the Engineering District.

2.03 The official record for manholes and conduit is the conduit location record which is maintained by the records posting group. The manhole diagram (CF 0068) is also an administrative record and is not to be used for continuing property records purposes.

Note: The fielded manhole diagram must be transmitted by the DSE to the Engineering Location Records unit. Where manhole diagrams have been completed and duct assignments have been accurately verified, the Engineering Location Records unit will remove duct assignments from the conduit location records.

C. Trunk and Toll

2.04 Trunk and Toll will be responsible for the diagramming of non-joint use manholes. When the manholes have been diagrammed, copies of joint use manholes will be obtained from facility

groups. The facility groups will work with Trunk and Toll in obtaining duct assignments. For manholes not diagrammed, the Trunk and Toll forces will be responsible for having the manholes diagrammed for their job via the Material Order Drawing (MOD) procedures (see 3.04).

D. Construction

2.05 The Construction forces will, upon request from the DSE or MSCE, be responsible for inspection of all manholes and recording all information as outlined in 3.05. The marked copy of the CF 0068(s) is then incorporated into the job prefielding and material ordering process (see Section 626-500-101) and returned to the MSCE for review.

2.06 In order to gain full benefit from manhole diagrams, it is ***imperative*** that the above responsibilities are met for all underground jobs. In existing conduit structures, material should ***not*** be ordered or placed prior to the completion of manhole diagramming process.

E. Maintenance

2.07 In order to ensure the integrity of manhole diagrams, maintenance is responsible for notifying the Engineering Location Records unit when their forces make any additions, removals or rearrangements via a marked copy of the CF 0068.

2.08 The Engineering Locations Records unit will correct the master CF 0068 and reissue a new copy to the appropriate Engineering and Maintenance groups.

3. PROCEDURES

A. Distribution Services Engineer

3.01 The DSE or MSCE will initiate the request to field manholes. The need to field manholes will generally be for one of the following reasons:

- Placing new underground cable (nonstock and stock)
- Rearrangement work (pair transfers, stub placement or removal, etc)
- Rebuilding a manhole

Note: In all cases, the fielding and diagramming of the manhole(s) will be completed prior to release of the approved working drawings.

3.02 The request to field and diagram manholes for nonstock underground cable will, in most cases, be in conjunction with the MOD P 504 'A' package. The MOD is required to be given to the Construction Force a minimum of 30 days prior to when the information has to be returned to Engineering by the MSCC.

Note: Manhole diagrams required in less than 30 days will need to be negotiated between Engineering and Construction on an individual basis.

The DSE will have the wall-to-wall measurements verified before issuing the MOD drawings to construction. The MSCC must use the assigned duct shown on the CF 0068 for the proposed cable. See 3.10(j) for procedure for resolving assigned duct problems.

3.03 If existing manhole diagrams are available (Form CF 0068 or CO 4553) for the work being performed, the DSE will post the following information to a copy of the diagram:

- Verified or proposed duct assignment

Manhole diagrams are always issued as part of the MOD P 504 'A' package.

3.04 If diagrams are not available for the manholes involved, the DSE or Trunk and Toll Engineer will provide the following information on a blank CF 0068 or CO 4553 form to be released with the MOD to construction for diagramming.

- Conduit configuration and duct assignments
- Manhole number, size, volume, and location
- Exchange, central office (CO) area, and route
- North orientation and direction to CO, or in the case of trunk/toll cables, a control office
- Proposed duct assignment

3.05 The procedure for fielding manholes in conjunction with stock underground cable,

rearrangement work, or rebuilding is identical to the nonstock underground cable process, except for the timing. The manhole diagram will be prepared per 3.03, and attached to the job (routine or specific) as part of the final working drawings. The status desk will not release the approval copy of the job to the Accounting group until the prefielded job has been returned. This will allow any corrections to be made without a P 504 of the job.

Note: An Initial Job Notification, Form A 4516-M, will be required for charging of time for job prefielding.

3.06 There will be situations where the DSE will not be able to prepare working drawings until the manhole diagramming is complete. In this situation, manhole diagramming will have to be negotiated on an individual basis between MSCE and MSCC. After the MSCC has completed the diagramming process, the diagrams are returned to the MSCE. Upon their receipt, the DSE will prepare rough final working drawings and submit them for final drafting.

B. Establishing the Master Diagram

3.07 Preparation of the master CF 0068 is a support group responsibility. It may be performed by the drafting or location records groups. Delegation of this function is a local decision. However for clarity purposes in this practice, a drafter will be used to prepare the master CF 0068 and the location records unit will be responsible to maintain the CF 0068. The preparation of the master CF 0068 will be accomplished in the following manner.

(a) Transfer ***only*** the existing plant shown on the rough diagram to the master CF 0068.

(b) Make a reproducible copy of the master CF 0068.

(c) File the master CF 0068 in the location records unit.

(d) The drafter will add new proposed cable and or new rearrangement work to the reproducible copy of the CF 0068. This will be the original final working drawing.

Notes:

1. The Engineering Location Records unit will prepost the proposed cable on the CF 0068 master in the normal manner and issue copies as required.

2. When the final job prints are released to Construction, each job will have a complete set of current CF 0068s attached.

3. It must be emphasized to the drafting forces the importance of accuracy when preparing the master copy from the fielded CF 0068.

4. It is permissible to use the Engineering Location Records unit to draft the master CF 0068 instead of the drafting unit.

C. Construction

3.08 Upon receipt of the initial MOD P 504 'A' package, the Construction Management Center (CMC) will forward a copy of the MOD to the MSCC. The MSCC will then assign a technician to do the manhole diagramming.

3.09 The technician's time for initial preparation of the manhole diagram (CF 0068) should be charged to Engineering expense account. Time charged to the Engineering expense account should be in minimum increments of one work day because it involves a temporary loan to Engineering.

3.10 The technician will:

(a) Field and diagram all manholes pertinent to the particular undertaking.

(b) Using the copy of the CF 0068 or CO 4553 provided by the DSE, record all existing plant in the manhole that has not been previously documented. All measurements will be recorded in inches. The following information is required to be shown on the CF 0068:

- Splice racking positions and splice case types per Section 632-305-015 (standard or stretch cases)
- Duct assignment
- Air pipes and manifolds
- Cable route within the manhole per Section 632-305-215
- Pull wires or ropes (existing)

- Cable size and year of placement
- Load coil, inductor and capacitor case locations and position
- Location of pulling irons
- Size and year of placement of load coil apparatus inductor and capacitor cases
- Proposed cable splice location and case size
- Future cable splice locations for shown future cables and stubs

(c) Verify the conduit configuration and existing duct usage against actual conditions.

(d) Determine and record the splice bay configuration and dimensions.

(e) Verify the duct assignment for the proposed cable as portrayed by the DSE.

Note: Location records will post the year of placement for the proposed cable to the master CF 0068 after the cable is placed and final posted by the records group.

(f) Recommend the splice location (splice bay and racking position for the proposed cable).

Notes:

1. It is extremely beneficial to the pulling crew if this splice location is marked on the manhole wall. This would also serve to reserve the splice locations.

2. Section 632-305-215 states how to assign ducts and racking positions.

(g) Measure and record the distance from the duct entrance to the center of the splice for the proposed cable. The method for obtaining this measurement is to make a model using a section of flexible conduit or air pipes formed as the proposed cable would be.

(h) Sketch in the proposed splice location, cable route, duct entrance distance, cable size and job number.

(i) Identify all available splicing space on each wall by means of vertical dimensions referenced to the floor or ceiling or between existing splices.

(j) Note any particular problems or situations pertinent to the proposed job. For example, the verified duct may be blocked, etc. Problems of this type are to be immediately coordinated between the MSCE and the MSCC. A field meeting to include the DSE, MSCE and MSCC may be required to resolve the problem. Also of particular importance is inspection for General Order (GO) 128 violations. If any exist, they must be documented and subsequently corrected.

(k) Complete minor reracking of existing cables to clear space for the proposed splice. Manholes requiring major reracking (over 15 minutes per manhole) will be noted with cables shown to be reracked on the CF 0068. This work will be completed by the construction forces.

3.11 Once the Splicing Technician has completed all the steps in 3.10, the marked copies of the CF 0068s or CO 4553s are returned to the MSCC. The MSCC, per 2.01, will complete the diagramming process and initial the CF 0068 or CO 4553. If a problem requires a joint visit to the manhole by the MSCC, MSCE and DSE, the solution will be documented on the CF 0068 form.

D. Final Posting

3.12 It is ***imperative***, particularly with CONECS, that the cable and associated equipment be placed and spliced as depicted on the CF 0068s. If there is an approved change in plan after the final issue of the CF 0068, it is the Splicing Supervisor's responsibility to forward a marked copy of the affected CF 0068 along with the marked worked prints to the location records unit via the CMC and the status desk. Location records will revise any CF 0068s requiring update to the "as built" condition.

3.13 The procedures described in Part 3 are presented on Chart A.

4. CENTRAL OFFICE CABLE VAULTS

4.01 The Form CF 0068 disciplines discussed in this section apply to CO cable vaults as well

as manholes. However, due to the size and varying design of cable vaults, the CF 0068 format would not be practical. The recommended alternative is to prepare a schematic sketch of the existing and proposed cable within the cable vault, depicting the same information as on the CF 0068 form, such as:

- Duct entrance distance (Distance of the racked cable from the entrance to the pot head splice for the proposed cable only.)
- Pot head splice location (bay and racking position)
- Cable racking route
- Air source and manifold location
- Main frame connector tail racking route and length of the proposed cable only.

4.02 The procedure for accumulating this information is the same as for the CF 0068. The cable vault sketch will also become a part of the final job package. The original copy should be filed with the Engineering copies of the CF 0068s for the involved CO area for future reference.

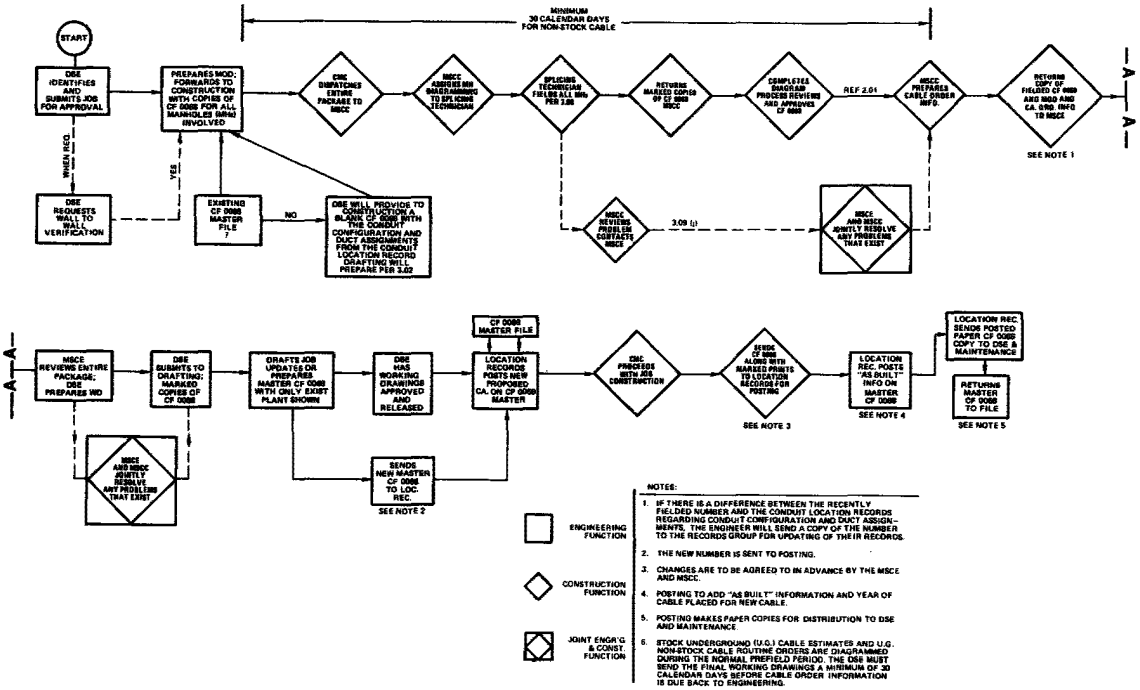
5. SYMBOLS

5.01 The outside plant symbols for the preparation and maintenance of the CF 0068 are contained in Sections 620-040-XXXPT.

5.02 Specific symbols used most often can be found in the following practices:

- Section 620-040-014PT — provides standard symbols for portraying cross-section type (multiple tile duct, multiple concrete duct, etc) and duct usage (abandoned, capped, leased, occupied, etc)
- Section 620-040-015PT — provides standard symbols for portraying splices
- Section 620-040-016PT — provides standard symbols for load coils, etc.

Chart A
CF 0068 Procedures



Explanations for Form CF 0068

1. Conduit configuration.
2. Pulling irons.
3. Manhole size and volume.
4. Existing cable (size and year placed).
5. Existing buried cable (size and year placed).
6. Assigned duct number to correlate with ducts in MH363 due to change in structure position between manholes.
7. Existing splice closure (splice type unknown).
8. Proposed splice with modular splice type identity.
9. Manholes location.
10. Job number for proposed cable.
11. Date diagram initially prepared by Engineering.
12. Manhole number.
13. Pressure manifold.
14. Pressure pipes.
15. Existing feeder air pressure pipe in duct.
16. Future stub shown.
17. Existing splice with modular splice type identity.
18. Distance between splices where additional splice racking space exists.
19. Distance from splice on wall to manhole roof.
20. Distance from splice on wall to manhole floor.
21. Standing load coil case.
22. Cable route (North shown).
23. Distance from bottom of splice to manhole floor.
24. Splice closure height.

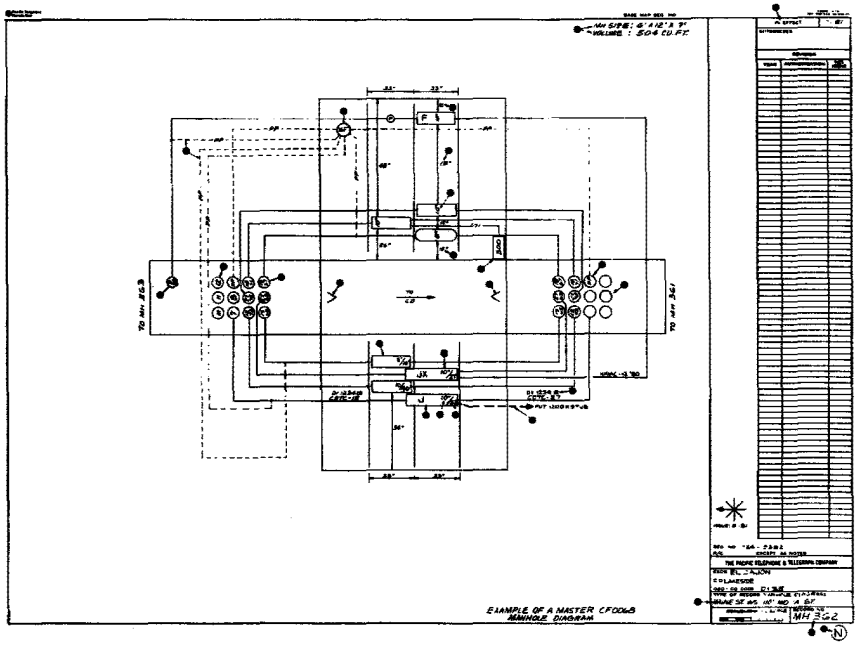


Exhibit 1