GLENDALE WATER & POWER

Electrical Construction and Operation

CONDUIT CHIPPING PROCEDURES AND SAFETY GUIDELINES

I. GENERAL

Conduit Chipping is a method used by the Substructure Section to remove concrete from an existing duct line that, in most instances, contains energized cables.

The purpose of this procedure, after the concrete is removed from the duct line is to intercept a vacant conduit and reroute it to a new location.

Therefore, due to the nature of this type of work, the following “Conduit Chipping Procedures and Safety Guidelines shall be followed and enforced for the employee’s safety and that of his/her fellow workers.

II. DEFINITIONS

A. BID SHEET / REQUEST

A form used to document work authorization requests, grounding requirements, operating service requirements and objectives, and supervisor authorizations. (See Appendix E.)

B. CABLE CONDUCTOR

A wire, cable or other conducting material suitable for carrying electric current.

C. CHIPPING GUN

A hand-held pneumatic tool approximately 24” in length and weighting between 12 and 15 lbs. that is designed to drive a gad to break small pieces of concrete from a duct line.

D. CIRCUIT MAPS

Maps maintained at the headquarters or district office to accurately reflect the up-to-date status of conductors in substructures or duct banks.
E. DEAD-END DUCT

A duct which is not usable because it is not connected or open to the conduit system at one or both ends.

F. DUCT

An individual tube, pipe, or conduit of various shapes, sizes, and material installed as part of a flexible system for the installation and removal of cables.

G. DUCT LINE

A length of duct(s) encased in concrete and intended to stabilize, protect, and serve as conduit for electric or communications cables.

H. DUCT TRANSITION

A change that occurs in a duct, when its relative position in a conduit line or section at one terminating point is different from that at the opposite terminating point.

I. DUCT SHEET

A reference list used to show cable and duct sizes, circuit numbers and designations, starting and ending locations, and reel and authorization numbers.

J. GAD

A pointed, hardened-metal bit driven by a pneumatic chipping gun to break concrete from a duct line.

K. INTERCEPT

A point at which a duct bank concrete envelope is broken into for the purpose of joining the existing duct line.

L. MAINLINE DUCT

A duct that terminates in a vault, maintenance hole, hand pole, pad, pole, or at a generating facility, substation, or customer station.

M. OBSERVER

A qualified chipper who monitors the chipping process and renders any needed assistance.
N. QUALIFIED CHIPPER

A “Qualified Person” trained in the proper procedures for removing concrete from an **energized** duct line.

O. QUALIFIED ELECTRICAL WORKER

A “Qualified Person” who has a minimum two years training and experience with high-voltage circuits and equipment, and who has prior experience with the work to be performed and the hazards involved.

P. QUALIFIED PERSON

A person who by extensive knowledge, training, and experience is familiar with the operation to be performed and the hazards involved.

Q. SERVICE DUCT

A duct which terminates at one end on a customer’s property in a pull box, entrance cabinet, or at a pothead position.

R. SPLIT PVC CHIPPING SLEEVES

PVC sleeves installed in a duct line to prevent or minimize chipping into the conductor.

III. CONDUIT CHIPPING PROCEDURES AND SAFETY GUIDELINES

The following “Conduit Chipping Procedures and Safety Guidelines” will be followed and enforced for the employee’s safety and that of his fellow workers.

A. IT SHALL BE THE DUTY AND RESPONSIBILITY OF EVERY EMPLOYEE TO:

1. Observe and comply with the Safety Policies and Rules of the Department of Water and Power and all federal, state, and local regulations.

2. Perform every duty assignment with due regard to their personal safety, that of their fellow employees, and of the public.

B. In case of emergency, which may result in serious personal injury, the supervisor or employee in charge shall take appropriate actions to prevent such injury or reduce hazard, which may include suspending or modifying these rules. Modification or suspension of any Safety Rule for this purpose shall only be done when it will decrease the risk to employees or the public.
C. No employee shall undertake work which they are not physically, mentally, or technically qualified to perform, nor shall they work in the vicinity of any apparatus or equipment without being familiar with its inherent hazards.

If the employee is called upon to perform work which they do not consider themselves qualified for, or feel that the work is unusually hazardous, they are responsible for bringing this matter to the attention of their supervisor and resolving it before attempting work.

D. All work locations shall be safely accessible whenever work is to be performed.

E. All confined spaces and other hazardous locations shall be inspected and tested and results made known to employees prior to commencement of work.

F. Upon arrival at a work location, each supervisor and lead worker shall call all involved employees together for a “Tailgate” Safety Meeting to outline the proper procedures to be followed and to ensure that they understand the hazards involved and the supervisor’s or lead worker’s plan for doing the work safely. As the work progresses, new hazards and changing situations must be considered and safety procedures initiated as required. All persons involved shall be made aware of any and all changes, and, if necessary, an additional tailgate meeting will be conducted.

G. Supervisor’s of crews working in the field shall make available, by the radio or at a designated spot, emergency information that includes, at a minimum, the following:

1. Emergency phone number to call and/or radio call procedures.
2. Circuit or station being worked on.
3. Exact work location, including street address, cross street, and Thomas Guide reference.
4. Location of nearest phone.

H. Tools, personal safety devices, and other equipment shall be kept in good serviceable condition. They shall be inspected by the user prior to use, and on the supervisor’s monthly tool inspection, replacements or repairs made as necessary, and they shall be used as the work hazard or condition requires.

I. When safety and/or common sense require the use of globes, appropriate gloves for the job being done shall be worn (i.e., chipping or jackhammering).
J. CHIPPING CONCRETE FROM ENERGIZED CONDUIT LINES

1. Goggles, protective face shield, hearing protection, and approved dust respirator or dust mask shall be worn during all chipping operations.

2. When chipping in substructures or confined excavations, forced air ventilation shall be provided.

3. While the chipping operation is in progress, a **Qualified Worker** shall be in close proximity to each worker at the same working level. This employee shall act primarily as “**Safety Observer**” for the purpose of preventing an accident and to render immediate assistance in the event of an accident. This **“Safety Observer”** and the worker shall give their undivided attention to the activities being performed. (See Safety Observer Guidelines, page 6.)

4. When constructing substructures around an existing duct line, the cables and/or duct lines containing cables shall be properly supported and protected from physical damage by an **Underground Distribution Construction Mechanic** or **Qualified Electrical Worker**.

5. Movements and re-routing of cables shall be done by **Qualified Electrical Workers**.

6. When chipping on a duct line containing energized high-voltage conductors (600 volts and above), and “OK TO ______” shall be obtained and a second **Qualified Person** shall be present and act as a **Safety Observer**.

7. Exercise extreme caution while exposing duct. Consider that all conduits contain energized cables until proven otherwise.

8. Cables adjacent to a chipping operation shall be de-energized when possible and protected as the hazard requires.

9. Before breaking into an energized duct section, workers shall become familiar with the location of all cables inside the duct. The work shall be done under the **direct observation of the supervisor**.

10. After concrete has been removed from the duct, break into the duct with a blunt instrument. (Inspect duct physically.)

11. Prior to chipping into a duct section containing 12 kV, 34.5 kV cables, the Underground Distribution Construction Supervisor II shall furnish the crew supervisor with a written step-by-step procedure. (See Appendices A, B, C, D, and E.)
K. PNEUMATIC TOOLS

1. Except in an emergency, the hose shall not be kinked to shut off the air.

2. Locking Hose Couplings and Anti-whip Cables shall be used to prevent accidental separation and whipping of the air line.

L. WHEN CHIPPING CONCRETE FROM DUCT LINE, PERSONAL SAFETY EQUIPMENT REQUIRED INCLUDES:

1. Safety Goggles
2. Face shield with flash protection
3. Hearing protection
4. Dust respirator or dust mask
5. Canvas backed, leather faced gloves
6. Coveralls made with Nomex material or electric arc shirt
7. Hard hat
8. Vest
9. Safety glasses
10. Fire extinguisher
11. Fire blanket
12. Burn Kit (Water-gel first aid kit)

M. CONDUIT CHIPPING OBSERVER

1. The Safety Observer is required to use the same personal protective equipment as the employee who is doing the chipping.
   a) Hard hat
   b) Eye protection (goggles and face shield with flash protection
   c) Hearing protection
   d) Dust respirator or dust mask
   e) Canvas backed, leather faced gloves
   f) Coveralls made with Nomex material or electric arc shirt

2. The Safety Observer should be in close proximity to the chipping, in the same excavation, if possible, within arms reach.

3. The Safety Observer will give his undivided attention to the activities of the work being performed.
4. The **Safety Observer** will watch to see that the employee doing the chipping does not chip directly into the duct.

5. The **Safety Observer** will pay close attention to the surrounding work area for hazards, falling earth, loose pavement, etc.

6. The **Safety Observer** will stop the shipping if he feels the employee who is chipping is becoming careless.

7. The **Safety Observer** will be prepared to render immediate assistance in the event of an accident.
Listed below is a step by step procedure which the Underground Distribution Construction Supervisor II is to follow to insure a safe and efficient operation when substructure construction crews are chipping concrete from duct lines that contain "Energized Cable."

Step 1  Check the circuit maps in the office to determine which cables will be involved. Find the feeder area you will work in.

Step 2  Have vaults or maintenance holes checked to see if cables in the ducts are the same ones shown on the vault details.

Step 3  Check with the Howard Dispatch Center to see if the cables can be “De-Energized”. If not, have the Electric Section send a crew to cover all energized conductors.

Step 4  Write a "Bid Request" to have the cables "De-Energized" or request an "OK TO __________," if they cannot be de-energized.

Step 5  Review your bid with the Crew Supervisor.

Step 6  Phone and fax your bid to the Howard Dispatch Center at least 48 Hours before you begin chipping on the duct line.

Step 7  Give the Crew Supervisor a copy of the "Bid Request" and a copy of the "Field Crew Supervisor's Checklist." Explain which cables will be "De-Energized" and which will remain "Energized."

Step 8  The Underground Distribution Construction Supervisor II shall monitor the radio while the chipping is in progress to see that the chipping is progressing according to plan.

Date: ____________
Time: ____________
Initials ____________
APPENDIX B

Glendale Water & Power
CONDUIT CHIPPING PROCEDURES
Underground Distribution Construction Supervisor I
Field Crew Supervisor’s Checklist

Location ________________________________ Date: ____________
Work Order___________________Drawing ___________ Sheet: __ Page 1 of 3
Circuit: ____________________
Work Authority Number: _____________________________

Step 1  Call the Howard Dispatch Center on the radio or the telephone to request the 'Authority Number' and the "OK to___________."

Step 2  Before the chipping operation is started or resumed, the crew supervisor shall conduct a "JOB BRIEFING." A record of all Job Briefings shall be kept (refer to pg. 3 of 3 of this checklist).

JOB BRIEFING: Examine the job drawing with your crew to determine what work has to be done. Explain which ducts contain cable and which ducts are vacant. Explain which cables will be 'De-energized' and which will remain 'Energized.' Assign crew members to open the substructures on each end of the chipping operation. Test for atmospheric hazards.

When testing is complete, verify which ducts contain cables. Also, verify the 'Circuit Names' or 'Numbers' of each cable. Inform the crew which cables will remain 'Energized' and which will be 'De-energized.'

DO NOT DO ANY CHIPPING UNTIL YOU RECEIVE THE “OK to _________” and "Work Authority Number."

When you receive the "OK to _________" and Work Authority Number from the Howard Dispatch Center, confirm to the crew which cables are 'De-energized' and which cables are to remain 'Energized.'

There shall be a clear understanding of the specified work to be performed and the conditions of the equipment, circuits, and isolating devices.

The Supervisor shall explain the equipment preparation to the “Qualified Person" and the actions that have been taken.

The explanation shall include:

The equipment involved and the nature of the work or testing authorized.
Isolating devices opened, closed, or tagged and any other preparation required to make work safe.

The boundaries.

The hazards.
APPENDIX C

Glendale Water & Power

CONDUIT CHIPPING PROCEDURES

Underground Distribution Construction Supervisor I
Field Crew Supervisor's Checklist

Location _____________________________________ Date: ______________

Work Order: _______________ Drawing ___________ Sheet: __ Page 2 of 3

Circuit: ____________________

Work Authority Number: _____________________________

Step 3  Assign a Qualified Attendant to monitor the radio while the "OK to ________" is in progress. This Radio Attendant must know the 'Circuit Names' or 'Numbers' that the "OK to" involves, the 'Unit Radio Number', and 'Emergency Radio Procedures.' Before beginning work under an "OK to" each day, you shall confirm the status of your "OK to" with a Howard Sub or power plant authorized representative. Procedures for "OK to's" are described in detail in the GWP Safety Policies and Rules Manual, Chapter 17, pp. 22-25.

Step 4  After traffic control warning devices have been installed and the work area is safe, assign the Underground Distribution Construction Mechanics to check the 'chipping guns' to ensure that they are in good working order. Have the 'Fire Extinguisher' and 'Fire Blanket' placed near the chipping site.

Step 5  Assign the Underground Distribution Construction Mechanics to begin chipping. A "Qualified Worker" shall act as a "Safety Observer" while the chipping operation is in progress. As each duct is exposed, carefully break into it to verify that it is vacant.

Step 6  When all chipping is completed, or at the end of each shift, clear yourself of your "OK to ________" to the Howard Dispatch Center.

Step 7  The chipping crew shall consist, at a minimum of:
   One (1) Underground Distribution Construction Supervisor I.
   Two (2) Underground Distribution Construction Mechanics.
   One (1) Qualified Attendant.

NOTE: One (1) copy of this Chipping Checklist to be given to Field Crew Supervisor and One (1) copy to file for duration of job.
APPENDIX D
Glendale Water & Power
CONDUIT CHIPPING PROCEDURES

Underground Distribution Construction Supervisor I
Field Crew Supervisor's Checklist

Location ________________________________ Date: ________________

Work Order: _______________ Drawing __________ Sheet: __ Page 3 of 3

Circuit: __________________________

Work Authority Number: __________________________

Record of Job Briefings

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Items Discussed: ______________________________________________
_________________________________________________________________
_________________________________ __________________________
Signature and Date    Signature and Date
_________________________________________________________________
Print          Print
Underground Distribution Underground Distribution
Construction Supervisor II  Construction Supervisor I
Today’s Date: _________________________

Requested By: ___________________    Unit # ____  Fax to: ________________________

Name of Station:
____________________________________________________________________

Name of Equipment:
______________________________________________________________________

☐ OK

To:

☐ CLEARANCE

☐ Field Switching Procedure: _______________________________ Job Order Number

Date Equipment Must be Ready for Work: ______________________________

Time Work to Begin: ________________________________________________

Date Equipment Will be Restored to Service: _____________________________

Time Equipment Will be Restored to Service _____________________________

Description of the Work to be Done
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Comments
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Switching Will be Performed By: ☐ Dispatch    ☐ SMR    ☐ Power Plant    ☐ Field Crew

Approved By: ___________________ Disapproved By: _______________________

Please submit bids by 48 hours prior to when work is to be performed. Same day requests will only be honored according to available personnel, job priority, and electric system status.