CONTROLLED DEMOLITION INCORPORATED

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PRELIMINARY PLAN & PROCEDURE

FOR THE DEMOLITION OF THE:

UNIT #8 - 378' CHIMNEY

LOCATED AT THE:

CRAWFORD GENERATING STATION
3601 SOUTH PULASKI ROAD
CHICAGO, ILLINOIS

PREPARED AT THE REQUEST OF:

MCM INDUSTRIAL SERVICES, LLC
35980 WOODWARD AVENUE, SUITE 210
BLOOMFIELD HILLS, MICHIGAN 48304

REVISION #01:

FEBRUARY 19, 2020

I. INTRODUCTION

Controlled Demolition Inc. (CDI) has been selected by MCM Industrial Services, LLC (MCM) to act as the specialty explosives subcontractor to perform the design for and the felling of the Unit #8 – 378' chimney, located at the Crawford Generating Station in Chicago, Illinois.

CDI's explosives demolition methods will allow for a more efficient, time saving and safer demolition operation as compared to conventional/mechanical demolition methods.

The basic premise of explosives demolition is to isolate the key structural supporting elements of the structure and eliminate them sequentially with explosives charges so the weight and construction of the structure can be dynamically controlled with differential velocity to ensure that the structure falls in a predetermined area.

The chimney will be felled its full-height to the east.

II. EXPLOSIVES DEMOLITION PREPARATION

Prior to any on-site work, CDI's "Competent Person" will conduct a visual survey of the structures per OSHA 29 CFR 1926-850(a) to evaluate its structural integrity in consideration of subsequent preparation. CDI will complete a written Competent Person Survey in concert with our design for the preparation and demolition of the structures.

UNIT #8 – 378' CHIMNEY:

MCM has mechanically pre-demolished the ductwork leading to the chimney and miscellaneous structures in the area, leaving an open fall path for the chimney to the east.

A. Preparatory Layout:

CDI's on-site representative will lay out the location of openings to be mechanically broken in the chimney as well as the sections of rebar to be exposed (for later severance) at the rear of the chimney - opposite the direction of fall.

B. Leg and Notch Creation:

MCM will utilize a hydraulic breaker mounted on an excavator to carefully remove the wall panels at the base of the chimney to create openings at the base of the chimney in the direction of fall. All rebar exposed as a result of this operation will be removed.

C. Drilling:

1. CDI's drill crew will use hand-held pneumatic drills powered by a 185 CFM compressor to drill small diameter holes per CDI's design into "legs" created at the base of the chimney.

2. Boreholes located over 6' off the ground will be drilled from a manlift.

3. CDI's drillers will be equipped with appropriate PPE for their scope of work.

D. Prior to explosives detonation, the legs created at the base of the chimney will be covered by MCM, per CDI design, using a continuous double layer of 11-gauge chain link fence and a continuous double-layer of 10 oz non-woven geotextile fabric to minimize fly of debris during explosives detonation. An additional curtain of similar fence and fabric will be hung outside of the perimeter of the base of the chimney.

III. QUANTITY & TYPE OF EXPLOSIVES

The following types and approximate quantities of explosives shall be used in the demolition of the structure:

A. Unimax (or its technical equivalent) gelatin dynamite, manufactured by Dyno Nobel, will be utilized by CDI to displace the legs created in the chimney.

B. Dyno Nobel non-electric detonators of various delays will be used to initiate the explosives charges. The use of delayed initiators will allow CDI to keep the maximum weight of explosives per delay to less than 7 lb, thereby reducing any air-blasting concussion generated by blasting operations.

C. 18 grain per foot detonating cord, manufactured by Dyno Nobel, will be used for non-electric cap initiation.

D. Electric blasting caps will be used to initiate the non-electric detonation system.

E. Preliminary quantities of explosives are as follows:

ITEM		QUANTITY	CLASSIFICATION	UN #
1.	Gelatin Dynamite	± 100 lb	1.1D	UN0081
2.	Detonating Cord	± 1 lb	1.1D	UN0065
3.	Non-Electric Detonators	± 150 pcs	1.4B	UN0361

IV. EXPLOSIVES TRANSPORTATION AND STORAGE

A. Explosives transport will be performed in accordance with DOT 49 CFR, parts 171-180, NFPA 495, Explosives Material Code and other applicable regulations.

B. Explosives will be delivered to the site approximately two (2) days prior to the scheduled demolition date by CDI in our DOT-permitted explosives transport vehicle, at a time to be determined.

C. While explosives are on site, they will be stored in CDI's DOT-permitted explosives transport vehicle and inventoried in accordance with ATF (CFR 27, 555.218-555.224), NFPA (495, Explosives Materials Code), and other applicable regulations.

D. During the time between explosives delivery and the demolition, the site will be protected during "non-working hours" by security provided by MCM.

V. INITIATION SYSTEM

All explosives will be initiated by a non-electric initiation system. The use of a non-electric system is safer than the use of electric blasting caps in that the concern about premature initiation due to radio frequency or extraneous electricity is precluded.

The initiation system will be designed and assembled in accordance with the guidelines recommended by the explosives manufacturer and the Institute of Makers of Explosives (IME). The entire initiation system will be triple checked by CDI prior to the actual detonation.

Just prior to the initiation, CDI will attach two (2) electric blasting caps to the non-el system. The use of electric blasting caps and non-electric delays with detonating cord is a standard industry practice and non-electric and detonating cord systems are designed for use on this type of operation. Proper industry protocol will be followed by blasters employing such initiation systems. CDI will keep all electric caps shunted until just before initiation and

the length of leg wires on the blasting caps will be kept to a minimum to additionally mitigate radio frequency hazards. CDI will conduct radio frequency survey in accordance with IME and other applicable regulations to ensure that there would not be sufficient radio frequency to cause the premature detonation of such electric blasting caps.

VI. EXPLOSIVES LOADING & HANDLING OPERATIONS

A. CDI will begin explosives loading operations approximately two (2) days prior to the scheduled demolition.

B. All explosives will be placed by CDI-trained individuals under the control of a City of Chicago licensed blaster.

C. Explosives handling will be performed in accordance with industry guidelines, standards and applicable regulations, OSHA 29 CFR 1926 900-914, NFPA 495, Institute of Makers of Explosives (IME).

VII. FIRING AND MISFIRING PROCEDURES

A. Firing Procedures

1. Prior to the introduction of blasting caps to the initiation harness, a predetermined area will be cleared of equipment, spectators and personnel not involved with the demolition. This exact Exclusion Zone will be defined following preparations and site meetings. Such an Exclusion Zone is based on personal safety with respect to air blast and the potential for fly of debris. Reference CDI Drawing #15116-EZ, attached.

2. Once verification has been acknowledged that the area is clear, CDI will attach the blasting caps and run the explosives firing lines to a firing position a safe distance from the structure. The firing position will be located at an area to be determined.

3. After multiple accountability clearances, CDI will commence a countdown procedure.

4. Following the successful demolition of the structure, the CDI Blaster-in-Charge will enter the demolition zone to assure that all the explosives have properly detonated. The exclusion area will be controlled by MCM until CDI designates all is clear in accordance with applicable regulations.

B. Misfire Procedures

In the event of a misfire, OSHA Regulations per 29 CFR 1926.911 will be adhered to as follows:

1. Personnel will be kept outside of the area for thirty (30) minutes following a misfire per NFPA 495 Explosive Material Code Regulations.

2. The Blaster-in-Charge, who is a CDI "OSHA-Competent Person," shall, in cooperation with MCM personnel, provide proper safeguards for excluding all employees from any potential danger zones.

3. No other work shall be performed except that necessary to remove the hazard of the misfire and only those employees necessary to do that work shall remain in the danger zone.

4. No aggressive attempt shall be made to extract explosives from a charged or misfired hole; an initiation system or a new primer shall be installed and the hole re-blasted. If re-firing of the misfired hole presents a hazard, the explosives may be removed by washing them out with water.

5. Should undetonated explosives be encountered outside blast holes in the exclusion area or if undetonated explosives are washed from holes, the explosives delivery vehicle, which is on standby, will be called back to the site where the product will be loaded back onto the vehicle for transport to off-site magazine facilities.

VIII. VIBRATION/AIR OVERPRESSURE MONITORING

Six (6), 3-component, Instantel MiniMate Plus seismographs will be placed around the blasting area by CDI to measure vibration and air overpressure generated by explosives demolition operations. Cursory pre- and post-blast surveys of adjacent, above-grade properties to remain will be conducted.

Explosives demolition is not typical blasting. Rather, it is the engineered progressive failure of structures induced by the systematic elimination of structural supports through the use of small amounts of strategically placed explosives. Vibration caused by rock blasting must not be confused with vibrations from the explosives felling of a structure. Ground vibration from blasting a building is primarily a product of the impact of the structures with the ground. The small amount of explosives used in CDI's method is simply a catalyst to allow gravity to do the work in collapsing the structures in a controlled manner. Demolition charges are typically loaded in relatively small quantities in structural members that are above the ground. Vibration effects imparted into the ground from the explosive detonation plays very little role in the generation of vibration.

Air overpressure from the explosives demolition of the structure will primarily result from CDI's use of a non-electric initiation system (for reasons of overall safety) as compared to an electric system. CDI's non-el system will be initiated using 18-grain detonating cord that will probably generate overpressure readings of approximately 140 to 150 dBL (below .01 psi), as measured at adjacent facilities. Such overpressure is brief/transient and below the US Bureau of Mines recognized threshold of damage to windows or structures. The detonation of explosives loaded in boreholes drilled into the chimney will create somewhat lower dBL levels.

Prior to discussion of historical vibration data from CDI's operations and estimation of vibration effects from the planned event, it is important to understand the recommended vibration limits used in the blasting and demolition industries. Vibration research by the United States Bureau of Mines (USBM) and others has established criteria relating the likelihood of damage to structures to vibration intensities and frequencies. The intensity is typically measured as particle velocity, or the rate of motions of an oscillating particle within a mass, usually the ground.

For residential construction, this research has resulted in the recommendation that vibrations not exceed 2.0 inches per second (ips). This criterion is designed to preclude "threshold damage" to residential structures. Threshold damage is defined as "loosening of paint; small plaster cracks at joints between construction elements; lengthening of old cracks". The damage threshold for load bearing masonry walls, engineered structures, heavy commercial buildings, or higher levels of damage to residential structures, is published as being between 5 and 6 ips.

Vibration and overpressure monitoring data will be furnished in a standard written report provided by CDI within approximately two (2) weeks of the event. Immediate visual vibration/overpressure readings will be available within approximately 60 minutes following the event.

IX. SEQUENCE OF EVENTS

Assuming an 8:00 AM shot time

06:30:00 AM:
- Set up barricades and secure the safety area which is to be determined. Police on site.
- CDI will check and perform final hook-ups of electrical circuitry for explosives operations.
- Placement of seismographs will begin.

07:00:00 AM:
- A Command Post will be established at a predetermined location. In attendance at the Command Post will be representatives from CDI, MCM, Chicago Police and Fire Departments and other involved parties.

07:15:00 AM:
- Security area closures to begin.

07:30:00 AM:
- Area security to be checked. Confirmation from local authorities that the area is being cleared.

07:45:00 AM:
- Confirm that the security area is clear.

07:58:00 AM: ♦ Two (2) long sirens indicated 2-minutes to blast.

07:59:00 AM: ♦ Sound a blast signal comprising of a series of short audible signals before the implosion.

07:59:45 AM: ♦ Final confirmation that the security area is clear.

07:59:50 AM: ♦ An audible countdown ("10, 9, 8...") over CDI's radios will be performed.

08:00:00 AM: ♦ Explosives felling of the chimney.

08:05:00 AM: ♦ CDI will inspect the demolition area and sound a prolonged audible signal to designate an "all clear."

X. CONDITIONS FOLLOWING THE DEMOLITION

The structure will collapse within five (5) to seven (7) seconds after initiation of the detonators.

Dust, an unpreventable byproduct of any type of demolition operation, will last in the general vicinity for five (5) to ten (10) minutes following the demolition. The duration of the airborne dust will be a direct function of the wind direction and velocity at the time of the implosion.