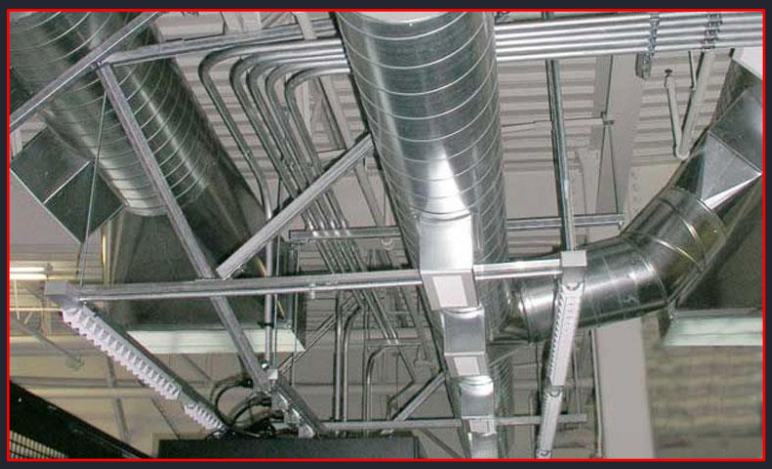


Removal of M&E

An objective comparison of the methods used to remove M & E and an analysis of the risks inherent in each method.

PERSES

Perses Limited
info@perses.org.uk
07595 293058

An objective comparison of the methods used to remove M & E and an analysis of the risks inherent in each method.

REMOVAL OF M&E

CONTENTS

REMOVAL OF M&E

Instructions and purpose of this report

Instructions and scope of the document

Perses Ltd was instructed by Mr Mike Kehoe of C&D Consultancy to provide an objective look at the different methods being used to remove the air exchange ducting, service pipes, and other M&E (mechanical and electrical) components, to compare the methods from a risk assessment perspective, including consideration of the pros and cons of each option.

This report is based on onsite observations during my site visit on Saturday 26th of November 2016, on location at Mincing Lane in London.

The original method of removing the M&E, as stipulated by 777's risk assessed method statement, was to cut the M&E out, working from the ground or, where necessary, remotely, from aluminium scaffolding towers and/or mobile elevated work platforms (M.E.W.Ps) using oxygen and propane fuel cutting techniques (burning).

The altered method, as specified by the Client, is to use reciprocating saws from aluminium scaffolding towers and/or M.E.W.Ps.

- The demolition manager on site on the day of the visit was Mr John Cole.
- The demolition supervisor on the site on the day of the visit was Mr Mick Mahoney.
- The site walk round was carried out with Mr John Cole.

During the walkaround, Mr Cole advised me that the client has insisted on the change of methodology against the advice of the specialist contractor 777 and the Specialist Demolition Consultant C&D Consultancy.

Limitations of the report

Costs

Due to the limited timeframe available on site this report will not include an in-depth cost analysis.

This report is strictly a comparison of methods to establish the safest approach.

However, it should be noted that a full cost report should be carried out as the contractor has been obliged to use a particular method at the behest of its client. This may have cost implications.

For a cost analysis to be accurate it should be carefully measured over a minimum of one-week and be completely independent of the comparative method. As part of this, the items which should be compared are:

- The overall cost of reciprocating saw blades compared to the costs of the gasses used during the burning process, and the area of metal cat out and processed during that time.
- The relative time frame to cut and process a measured area: one method may be faster which could impact costs.
- The amount of man power needed to cut and process the measured area, as one method may require more men due to reaching the exposure limit value (E.L.V).

Executive summary

This executive summary provides an overview of my thoughts on each of the methods on a section by section basis.

Summary of findings

I conclude that the safety overall method for removing the M&E is by propane and oxygen fueled hot-works (burning).

This is because this method includes the following characteristics:

- Reduced risk of dropping material striking the operative or the working platform;
- Eliminated hand-arm vibration; and
- Safer secondary handling.

Hazards

I have identified the following areas of concern which are applicable to the method of removal:

Checking Equipment

All working equipment require pre-use checks[1] prior to using the equipment to ensure it is fit for purpose and does not pose any danger to the user.

Specific checks are required for the items of equipment being used:

- Reciprocating saws are required to undergo Portable Appliance Testing. The frequency required for 110V electrical equipment2 used on construction sites is every 3 months.
- Gas equipment requires to have a thorough annual inspection3, including functional tests to ensure correct operation, unit checks for flow restrictions, reverse flow checks to ensure correct operation of non-return valves and pressure sensitive cut off valves where fitted, and leak testing on all fittings prior to lighting the torch.
- Using gas equipment also requires additional, specialist training which is not a requirement with the reciprocating saw.

Personel Protective Equipment (P.P.E)

There are specific items of P.P.E[4] required when carrying out the individual tasks. These are as follows:

Oxygen/propane cutting tasks:

- Operatives will need to wear flame retardant clothing to BS EN 11612 with high visibility rating to BS EN 20471 Class-2, heat rated protective gloves to BS EN 407 for thermal hazards, and safety boots to BS 1870.
- Operative should wear a shade-5 B-grade eye protection to a BS EN166 standard, with a minimum of a 15% tint at all times when carrying out hot works.
- The operatives may be required to wear an ABEK1 Charcoal Filter Ori-Nasal respirator when working with coated steel.

Reciprocating saws:

- Safety goggles to a BS EN166 B should be worn where there is the possibility of flying objects, sparks, et cetera.
- Safety gloves to a BS EN 388 should be worn where there is likelihood that hands may be injured by a mechanical hazard.

[1] As required by Regulation-4 and Regulation-6 of the Provision and Use of Work Equipment Regulations 1998, and the Health and Safety at Work Act 1974, Section 2 (2) a.

[2] As per HSG107 (3rd edition) 2013 Maintaining portable electrical equipment.

[3] As per the British Compressed Gas Association Code of Practise CP7: The Safe Use of Oxy-Fuel Gas Equipment (Individual Portable or Mobile Cylinder Supply).

[4] Personal Protective Equipment at Work Regulations 1992

Services

Prior to any works on M&E beginning, all service disconnection and purging must be carried out. Written confirmation of this will be required. Further checks may be required on some services.

Cutting out

During the cutting out process there is an elevated risk of the pipes/ducting collapsing: load paths are changed and supporting clips/brackets/threaded bar is cut.

Oxygen/propane cutting tasks:

- During the oxygen/propane cutting method, falling material will drop, due to the length of the gun and control of the cut (see photo-1 in Appendix A), away from the operative. This will create a small degree of shock load to the floors.
- Cutting the material from the ground eliminates the need for an operative to work at height for a prolonged period. For sections that do require access from height, the fact that the burning method is quicker reduces the time spent at height. This also provides distance away from the dropping material.

Reciprocating saws:

During the reciprocating saw cutting method, the falling material will drop much closer to the operative. This increases the likelihood of injury to the operative and/or striking the access equipment. The latter gives a degree of shock load for the M.E.W.Ps/scaffolds.

While cutting the material at height, the operative is exposed to vibration, working at height and an increased risk from falling materials. The latter could cause injury or, if the material lands on the access platform, would result in shock loading imposed onto the scaffold/M.E.W.P.

Additionally, during the cutting out process, a reciprocating saw has a tendency to jam as it cuts. This increases the risk of Work-Related Upper Limb Disorders as the equipment transfers the forces onto the operative when jamming, resulting in the operative typically exerting additional force to free the jammed blade.

In addition, during the cutting to size process using the reciprocating saw, the operative is exposed to huge amounts of vibration (22 m/s^2 = 24-minute until E.L.V) and ergonomic issues from bending over to cut the material. On average, material takes approximately three times longer to cut using reciprocating saw, resulting in operatives being exposed to vibration for a longer period of time.

The approximate timing for cutting the 9" sprinkler system water pipe is 30 seconds. If the cut is carried out every 2m to process the pipes, the operative would be able to cut out 48-linear meters of pipe per day until they reach their M.E.L due to the 24-minute maximum. Thus, to keep the works progressing and not exceed individual vibration exposure limits, 16 men per day would be required for this task.

Secondary handling

Once the material has been cut using reciprocating saw the material has very sharp edges (see photo-3 in Appendix A) which presents a very serious cut hazard, which requires an additional control measure of a Kevlar® sleeve. This control brings the following hazards: incorrect use; maintenance; hygiene issues; and limitations (they do not protect above the elbow line).

Once the materials have been cut using burning method, edges will be smooth due to the steel melting. I have considered the risk of puncture wounds (see photo 4 in Appendix A) from material points. However, on balance, the material is unlikely to cause a puncture wound: it is prone to bend due to the thickness of the material, it is rounded at the tip, and is softened due to the heat process.

Fumes and dust

While cutting metals coated with zinc oxide there is a risk of metal fume fever. This has been controlled using local exhaust ventilation system (see photo 5 in Appendix A) venting to atmosphere. The issue is common to both methods, but is significantly increased with burning. This causes the release of the zinc oxide as a fume which can be inhaled; with the reciprocating saw, the metal is heated through friction, and cutting the metal releases dust which can be inhaled.

A secondary control of P.P.E is in place: all personnel on site have Sundstrom SR-100 face fitted half-masks with ABEK1 gas filters and P3 particulate filters.

It should be noted that the time for negative pressure masks is 1 hour[5], after which a rest period should be granted.

Burning is an obvious hot process which requires a hot-works permit and an additional control of a fire watch and water control (as can be seen in photo 6 in Appendix A).

Cutting using reciprocating saw is also a hot-work but the hot element is less overt, which may lead to complacency.

There is a hazard which may have been missed during the assessments: water seeping into the concrete floors. This may cause damage to the slabs, or create issues with any live services in lower floors.

There are no issues of oxygen enrichment caused by metals: none of the metals on the site being cut were oxidising metals, which would require additional fire planning and/or specialist firefighting equipment.

Oxygen enrichment caused by the release of oxygen is controlled by the use of L.E.V. Windows should also be kept open where possible to encourage air movement.

5 As per HSG53.

Closing Summary

Based on my observations, I have concluded that the safest, fastest, and most cost-effective method of removing the M&E is the use of propane and oxygen fueled hot-works (burning).

This is due to the following reasons:

- By burning the steel at a safe working distance using 6' torches, the dropping material falls away from the operative. This reduces risks.
- Burning the material significantly reduces time spent working at height, and exposure to vibration and related upper limb disorders.
- The edges of the cut sections of the material are rounded by the hot process and pose a much lower risk of cuts or wounds during handling.
- Noise exposure and control is apparent in both processes, however, without the correct equipment, the decibel output of each process is unknown. That said, the key issue is protection of the operative, which will require P.P.E. appropriate to the process in question.
- Both sets of equipment require pre-use checks and weekly recorded checks as per the Provision and Use of Equipment Regulations 1998. However, the use of burning requires specialist training to ensure that equipment is connected correctly.

In closing, it is my observation that the client's instructions to change the methodology set by the specialist contractor 777, and agreed with the specialist consultant C&D Consultancy, represents a fundamental change in the approach to these works. The client's preferred method was not safer and may have exposed workers to higher risks than necessary given the nature of the project. It was also a less efficient method. This is likely to have had an impact on project timescales and financial outlay.

Yours sincerely

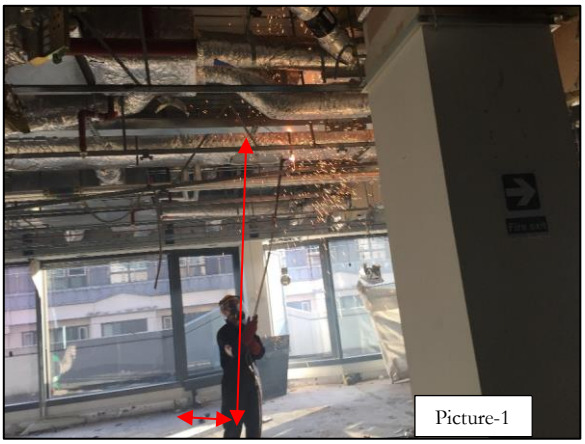
For Perses Ltd

Mr Stephen McCann CMIOSH MIDE MIIRSM FInstLM

Director
November 26, 2016

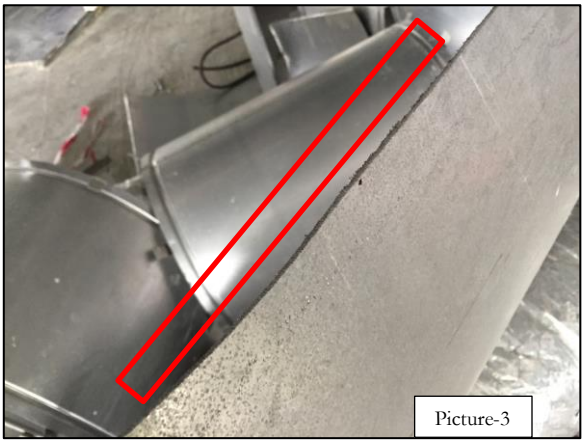
Appendix A: Photographs

During the site visits, several photographs were taken to help aid in the productions of the report.



Picture-1

Picture-2



Picture-3

Picture-4

Picture-5

Picture-6