



Industrial Site Workplace Transport and Safety Management

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Industrial transportation in the workplace site can be defined as all movements of persons, transport and handling of raw materials and products within the company (within and outside of buildings). Industrial transportation in the workplace site is rarely identified as such in the workplace. Often when it comes to safety in transport, the focus is more on the traffic outside the company and outside the institution, and every year, a significant number of people are injured in accidents involving vehicles that are used within company, such as forklift trucks, dump trucks, compact tractors or cranes. Vehicles may include cars, (including visiting vehicles), vans and large commercial vehicles when operating off the public roads. Within the boundaries (fence) of the establishment, the work activities involving vehicles are treated as "Operating expenses", which is generally regarded as ancillary activities difficult to control due to the random nature of traffic, interference with suppliers and deliverers, the variety and multiplicity of the movement of trucks, pedestrians, etc. This leads many companies to leave their internal circulation spontaneously self-organization and lack of organization can increase work-related accidents. The internal circulation may include activities such as: arrival and departure to/from the company, journey into the workplace, loading, unloading and security of loads; sheeting, laminating, and maintenance of the vehicle. The risk assessment should therefore include all the following aspects: personnel travel, parking of vehicles, interference and the intersection of flows, characteristics of routes (pedestrian and vehicular), visibility conditions and natural and artificial lighting, behavioral norms and procedures to be adopted, training and information for personnel, management procedures. Better planning, training and awareness, and appropriate use of vehicles, can avoid most of these accidents. No less important is a proper study of layout and paths within the company. Employers have a duty to identify risks associated with these activities and to ensure that health and safety of its employees is not put at risk. This paper presents some key elements and transport in the workplace, particularly in an industrial area and shows how these aspects can be considered and managed to maintain security.

1. Introduction

Every workplace will have risks that are specific to the location, the type of work, the people employed, the vehicles used and the way things are done. The issue of industrial transport in the workplace site has been discussed in a guidebook by INRS (2000). Here we consider the case of medium and large industrial, but this information could also be useful for commercial sites, smaller businesses and for other places such as the construction sites. In any case, a well designed and maintained workplace will make transport accidents less likely. In every work activities involving vehicles there are common aspects to consider. These include: arrival and departure; travel within the workplace; loading, unloading and securing loads; sheeting; coupling; and vehicle maintenance work. The first essential

work about this matter is by INRS, (1985) – “Establishment of a traffic plan on the workplace. recommendation CNAM R 259”. A more recent investigation on the role of industrial transportation in the workplace may be found in the employers’ guide HSG136 by HSE - Books Workplace transport safety. Figure 1 show the circulation within the company.

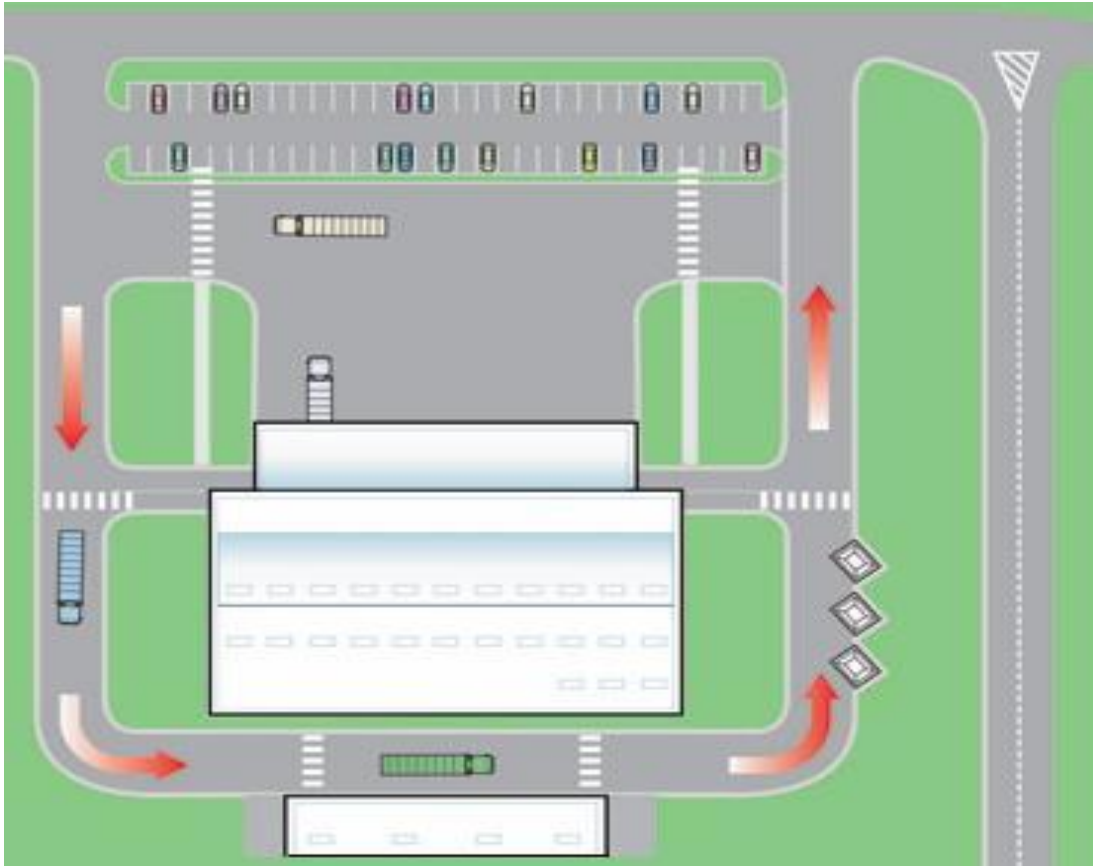


Figure 1: Industrial transportation in the workplace site.

2. Risk assessment

It is important that risk assessment is thorough and accurate because it is necessary to use it to decide what to do to control risks. The first thing to do is to identify the work activities involving vehicles (including visiting vehicles) over a reasonable period. This could be over the course of a day, a week or maybe a month. a clear picture of vehicle and pedestrian traffic in the workplace must be build up, to make sure nothing important is missing. A plan of the site can help us to see where vehicles are operating, and where any dangers might be. Next, the risks associated with these activities must be identify. In order to identify hazards, must be taken into account: The vehicles themselves, The routes or roadways used by the vehicles, What drivers are doing, What other people are doing. When we are looking for hazards, we must include any that already have precautions in place to prevent the hazard from harming anyone.

Employers must ask their drivers, supervisors and any other employees at the site (including contractors and, possibly, visiting drivers) for their views on any problems and what could be done to make the work safer. Most employers carry out risk assessments during the normal course of their work. For example, when hiring new drivers, an employer would normally identify how much information, instruction or training they need, to make sure that they are able to carry out their duties

without making mistakes or causing accidents. In recognising that there are risks associated with having new drivers, and then deciding what precautions to take, the employer has carried out a risk assessment and acted on it. The risk assessment should be reviewed from time to time, to check that it is still relevant. Each risk assessment should include a date for when a review is due, which should take account of the type of work and the speed of changes, which are likely to be different for every workplace.

Sooner or later new vehicles are likely to introduce or the traffic routes may change, or the nature of the work activities relating to vehicles may change, which can lead to new hazards.

Risks should be assessed before any significant changes. This will help keep risks as low as possible from the moment the changes are introduced. Employees must consult either directly or through elected safety representatives if the changes could substantially affect their health and safety.

The risk assessment should always keep up to date with working practices and equipment, no matter what reviews may be due 'soon'. Where possible, it is recommended to change the layout of the workplace or use vehicles with appropriate safety features (for example, have separate pathways for pedestrians, use road humps, or use vehicles with speed limiters). Safe systems of working should be set up (for example, enforce speed limits).

3. Management of traffic flows

Every workplace must be organised so that pedestrians and vehicles can circulate safely. Workplace traffic routes must also be suitable for the people and/or vehicles using them, and pedestrian movement counts as 'traffic'. Where vehicles and pedestrians share a traffic route, they must be safely separated. The first thing to do is define a map of the plant. Determine and plot the routes on the plan. In doing this vehicles and pedestrians should be separated whenever possible. The choice of the route depends on the kind of vehicles that move around the site, including less-common vehicles (such as emergency services) and how much room they need to move safely. If possible keep vehicles in their areas, and pedestrians clear of them. Complete segregation is the ideal, although often not practicable, but the further apart you can keep vehicles and pedestrians the better. People do not only need to be segregated from vehicles that are travelling. They also need to be kept separate from the area that a vehicle moves through when it is working – for example, the area that the body of an excavator moves through when it is working. Good examples of complete segregation include footbridges and subways. Protective barriers, clearly marked pedestrian and vehicle routes, and raised kerbs can all help. Building entrances should have separate doorways for vehicles and pedestrians, with vision panels on all doors. Barriers or guard rails may be useful at building entrances and exits, at corners, and to prevent pedestrians walking straight onto roads. Despite a good traffic analysis, there may still be areas in which there are crossing flows or more generally interference flows (in a common path in the same or opposite direction). The risk of collisions between vehicles and especially between vehicles and pedestrians must be taken into account. In addition to the proper means of prevention for each vehicle, which are not treated here, the questions to ask are about the physical layout of the intersection or the path to eliminate or limit the risk: The architecture of the intersections or the path can be designed or modified to create separate tracks?

Where pedestrian and vehicle routes cross, well-marked and signposted crossing points should be provided. Use dropped kerbs where the walkway is raised above the driving surface. Provide barriers, rails or deterrent paving to direct pedestrians to designated crossing points. On routes used by both pedestrians and automatic (driverless) vehicles, take care that vehicles do not trap pedestrians. The vehicles should be fitted with safeguards to reduce the risk of injury if they do hit someone. Provide as much clearance as possible between vehicles and pedestrians, and make sure that fixtures along the route do not create trapping hazards. The issue of multiple crossing areas has been discussed in a paper by INRS, ED 715, (1994) – Traffic within the company – "Method of collecting data to determine areas multiple crossing". Once the movements of transport and displacement (traffic flows) are determined, the areas where the flows overlapping must be identified. It is very important to analyze these areas to modify the conditions considered as an aggravating factor (different traffic intensity, obstructions, soil conditions, visibility, lighting, ...). The analysis of the reasons for the displacements (the need for production, shipment, administration) associated with the reasons involving (configuration

and implementation, operation, regulation of work organization, technical process) give us the parameters that determine the circulation. The search for possible actions of the various streams, the location of buildings and workstations, suggest solutions that can be implemented. The solutions adopted are those following the classical model of prevention. These tend to focus on "social prevention" in relation to the "individual prevention". The basic solutions are: remove the traffic flow, remove the cross-flow or interference with the flow, reduce the frequency of traffic, inform people who use these routes.

To do this the site operator should provide contractors with appropriate health and safety information, so that the work can be done safely. For example, share information about the workplace, routes to be used, vehicles and equipment on site, specific hazards, and other people on site, including other contractors or visiting drivers. Visiting drivers should be told the layout of the workplace, the route they need to take, and relevant safe working practices (e.g. for parking and unloading), as they may not have visited the site before. Consider printing site rules, directions, maps, approach information (eg narrow routes, weak bridges) on the back of order forms or invoices, so visiting drivers know what to expect before arriving on site. Visiting drivers should not have to enter potentially dangerous areas to move to or from their vehicles or places such as the site office, or lavatory or washroom. In some cases, the public may have access to sites (e.g. to visit a farm or factory shop). They should, as far as possible, be kept away from workplace vehicle routes and loading, unloading and parking areas. Safe routes for the public should be provided and clearly signposted. Lift trucks are especially dangerous to the public, and as far as possible they should be kept apart. If lift trucks have to operate in public areas, a safe system of work should be developed, and its operation monitored

4. A safe site

A well designed and maintained workplace will make transport accidents less likely but some aggravating conditions must be taken into account. Often, small cheap things can make a difference, such as making sure visibility is good, lights are adequate and working, potholes are filled or markings and signs are clear.

Forward visibility needs to be good enough to allow drivers to see and avoid hazards. Adequate visibility is related to vehicle speed and the distance drivers need to stop or change direction safely to avoid hazards. Additional factors affecting visibility are available light, dust, bad weather, the height of the driver above the road and the arrangement of vehicle windows. There should be enough visibility at junctions and bends to allow drivers and pedestrians to see anything that might be dangerous. Avoid sharp or blind bends, and where they are unavoidable consider measures such as mirrors to aid vision around corners. When visibility at a junction cannot be improved sufficiently, stop signs or traffic signals may be appropriate. Alternatively, consider using a one-way system. Drivers often have trouble seeing behind their vehicle while they are reversing, one of the best ways to improve safety is to make sure vehicles do not have to reverse. This is best achieved by using one-way systems with drive-through loading areas. One-way systems also help pedestrians know which direction vehicles are likely to be coming from, and it is easier to arrange routes so that they allow for good visibility around corners and at crossing points. One-way systems should normally work clockwise around a site, as this is the direction most drivers will expect.

Every workplace must have suitable and sufficient lighting. Roads, junctions, pedestrian routes and areas, and places where there is regular movement of vehicles or mobile plant all need particular attention. Where lights are positioned is important, eg lights placed in the centre of loading bays may be blocked by tall vehicles. Lights placed between bays will often be more effective. Where drivers have to reverse towards strong lights, take care that the lights are not placed so that they dazzle the driver, either directly or through mirrors. Measures may be needed to avoid sudden changes in lighting levels, eg when moving from a dark warehouse to bright daylight.

Limiting vehicle speed is an important part of traffic control. The best way is to use fixed features (traffic calming features) that stop drivers travelling too quickly. Examples include speed humps, narrowing routes by use of bollards, raised kerbs or chicanes, and 'rumble' strips or areas. However, the wrong traffic calming feature can sometimes increase risk, eg by affecting the stability of vehicles or less-secure loads. The various features available should be assessed and those most appropriate should be

selected for the traffic using different site. Traffic calming measures should be clearly visible. Many features can be lit or made reflective.

Speed humps are often used to control speed but need to be used with care as they can create hazards of their own. Speed limits are also widely used, but they need to be sensible and practicable, or drivers will be tempted to break them.

Use route markings to indicate traffic lanes, route edges, priority at junctions, stop lines, pedestrian crossings and so on, and to instruct drivers. Use warning signs to indicate hazards along the way. Traffic lights, speed sensors and flashing warning signs can be used to control traffic flow and speed.

White road markings should be used to regulate traffic flow, and yellow ones parking, using the same types of marking as on public roads. Markings can be made reflective for improved visibility.

Place signs so that people have time to see them, and take appropriate action before they reach the hazard. All signs should be clearly understandable, be easily noticed, clean and well-maintained so that they are visible at all times. Where overhead clearance is limited, consider the use of warning signs. Reflective (and preferably illuminated) signs should be used when they have to be visible in darkness. Carelessly parked vehicles can create a risk of injury. Vehicles should preferably be parked in a dedicated parking area.

Pedestrian areas and walkways should be clearly marked, kept in good repair, and (as far as possible) segregated from vehicle routes. Stationary objects, including parked vehicles, should be kept out of the flow of traffic and people around the workplace. Wherever practical, parking areas should provide for all vehicles using the workplace – that is, for work-related vehicles and for private cars. People and vehicles should be kept apart in and around parking areas by using pedestrian and vehicle exclusion areas.

Workplace must be kept free from obstruction and from anything that may make a person slip or fall. Traffic routes should be maintained to provide a good grip for vehicles and people, they should have firm and even surface, and be properly drained. Spilled loads, anything that falls from a vehicle, used packaging, and anything else that creates a risk of falling or tripping should be dealt with as soon as possible.

5. Training and information

In order to find right solutions related to risk factors, it is necessary to have an overview to prevent an improvement of one aspect (eg separate pedestrian paths - vehicle) leads to negative impact on another aspect of the traffic (such as stretch paths). The management of traffic flows and technical adjustments are completed through training and information. Every driver, and particularly younger or less experienced drivers, should be instructed to drive and work in a responsible and careful manner.

Drivers should be capable of operating the vehicle and related equipment safely, and should receive appropriate instruction and training. Employers and managers should never allow anyone who is unfit through drink or drugs to drive any vehicle. In a recent study of deaths and injuries involving site dumpers, less than half of the employers had bothered to check the drivers' competence.

Where the workplace has contractors or visiting drivers, the site operator or principal employer should check that they are competent to carry out their duties responsibly and carefully, eg by obtaining evidence of competence from the drivers or their employers. There are two main ways of ensuring competence for a job, which should be used together: Make sure new recruits are competent. Have recruitment and placement procedures that ensure all your employees (and managers) are competent, or can learn the necessary competencies on the job.

the competence of existing employees must always be ensured. Existing employees should have the skills and experience needed for safety, and they should maintained them. If their work changes they should be competent for their new work. Training needs will depend on an individual's previous experience and the type of work they will be doing. The risk assessment should help determine the level and amount of training needed for each task. Newly recruited drivers will usually have the greatest training needs, an ongoing programme of training and refresher training for all workers should be implemented, to ensure their continued competence in a changing workplace.

the information given by employees about their work experience should be checked. For example, check that references to training schemes are supported by certificates. Test employees on site, even

when they produce evidence of previous training or related work experience. Training will often need to cover: general information about the job, eg route layouts, or how to report risks or accidents; training and/or checks to ensure that drivers can work safely, including making sure they know how to operate the vehicle safely, and information about particular dangers, speed limits, parking and loading areas and procedures etc; how supervision arrangements, including disciplinary measures for health and safety breaches, will be applied. Always check that trainees understand what they have been told. Keep training records for each employee. Consider keeping a central register of who in your workplace is competent to control which vehicle. This will make safely allocating tasks and keeping track of abilities much easier.

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