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Fire Protection System in Car Parking Yard in Car Manufacturing Plant

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Abstract— Fire safety refers to safety measures that are taken to stop or decrease the probability of a fire which may product in death, injury, property damage, alert those in a arrangement to the attendance of an unrestrained fire in the event one occurs, better make possible those endangered by fire to stay alive in and abandon from exaggerated areas, or to reduce the damage caused by a fire. Fire safety actions contain those that are considered during the erection of a building or implemented in structures that are previously standing, and those that are trained to occupants of the building. Threats to fire safety are referred to as fire hazards. A fire hazard may comprise a condition that increases the likelihood a fire may begin or may obstruct escape in the event a fire occurs. Fire Safety Adequacy is to ensure that a fire release anywhere in the plant can be adequately dealt with to prevent escalation of the emergency (fires or explosion).This enables assessment of the adequacy of the fire prevention, fire protection and firefighting measures, Assessment of mitigation factors and Suitability of fire protection system in car parking storage yard. This report presents a review of fire protection system of car parking yard discussed in a car manufacturing plant. Safety concerns with their systems are discussed. This information should be useful to safety standards following, effectiveness of fire protection system analyzed and gap analysis to be addressed and executed successfully.

Key words: Safety, Fire Protection, Hazards, Parking, Yard

I. INTRODUCTION

A search of the literature on auto-mobility, parking, and historical geography revealed scholarly research into many diverse uses and eras of the street. This review is shaped around emergent themes concerning the use of the streets (which for the purpose of this study include sidewalks). These themes include auto-mobility, streets as the site for circulation and storage of vehicles, streets as a place and a commodity, the historical geography of streets, and the role of obduracy in maintaining current street practices. The literature in this review represents a broad spectrum of theoretical writing and historical sources [26-30]. Private residential garages essentially privatize street space through the appropriation of public curb space for driveway

access. On-street (public) parking spaces are greatly diminished, as this study demonstrates, by the addition of curb cuts to access off-street private garages. Within the Mission District, garages and garage doors are the most visible manifestation of the impact of auto-mobility on the built environment. Yet, there has been little scholarly attention focused on the impacts of retrofitting residential units to accommodate parking garages [1-17]. The majority of buildings within the Mission District study area were built before the advent of auto-mobility; hence, the majority of garages were voluntarily added to these structures, rather than legally required. Minimum off-street parking requirements were first \ mandated in 1955 for most residential neighborhoods (including the Mission District) – even today, more than 50 years later, new residential developments in the Mission District are required to contain a minimum of one parking space per dwelling unit. This aspect of residential parking has received the most scholarly attention. Shoup (1997) argued that parking is the "unstudied link" between transportation and land use. He found that minimum parking requirements significantly increase the cost of development, reduce urban density, and artificially inflate demand for parking. Reducing or eliminating these minimum requirements and exposing the hidden costs of parking would, Shoup suggests, both lower the cost of housing and decrease the incentives to drive. Shoup's research focuses primarily on new development and on street parking policies, leaving the issue of added garages largely unexplored (Shoup1997). Yet he does briefly cite a survey conducted in a development outside Reading, Fire protection is the study and practice of mitigating the unwanted effects of potentially destructive fires. It involves the study of the behaviour, compartmentalization, suppression and investigation of fire and its related emergencies, as well as the research and development, production, testing and application of mitigating systems. Buildings should be constructed in agreement with the description of the building code that is in corollary when a submission for a building authorize is made. Building inspectors check on fulfilment of a building under creation with the building code. Once construction is complete, a building should be maintained in accordance with the current fire code, which is imposed by the fire anticipation officers of a local fire department. In the occasion of fire emergencies, Fire fighters, fire investigators, and other fire avoidance personnel called to mitigate, examine and study from the injure of a fire. Lessons erudite from fires are practical to the authoring of both building codes and fire codes [21-30].

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II. METHODOLOGY

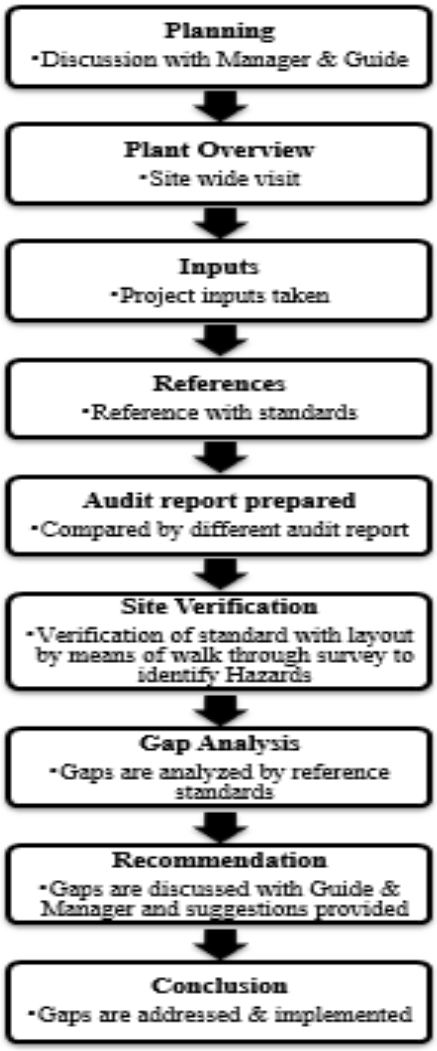

Fig. 1 Methodology

III. EXPERIMENTATION DETAILS

Emergency Systems Healthiness check sheet was prepared for each department such as Hydrant systems Assembly points, Manual call points Mega phone and self-contained breathing apparatus etc. It was shown the fig 2. The checklist is framed based on the NBC Part-4, 2005 minimum requirements. The information is collected from various BIS standards. Based on the effective study of NBC and IS standards the key items are tabulated of each every equipments installation and maintenances. The Final check list made based on the brainstorming section along with safety, Plant Engineering and Emergency Response Team. The fire protection audit was carried based on this checklist as given below. Initial position layout was prepared for protecting the entire system from fire and it was shown in the fig 3.

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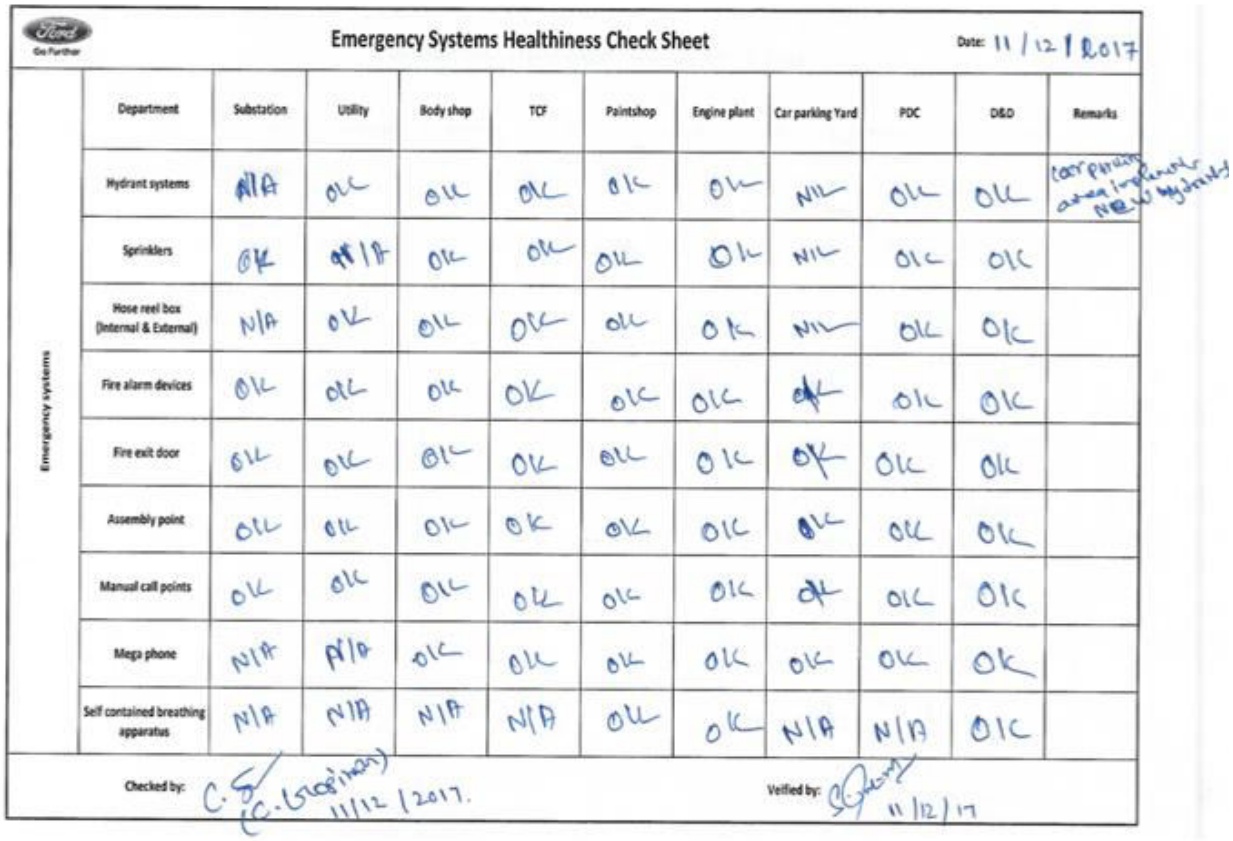

Emergency Systems Healthiness Check Sheet

Date: 11/12/2017

	Department	Substation	Utility	Body shop	TCF	Paintshop	Engine plant	Car parking Yard	PDC	D&D	Remarks
Emergency systems	Hydrant systems	N/A	OK	OK	OK	OK	OK	NIL	OK	OK	
	Sprinklers	OK	N/A	OK	OK	OK	OK	NIL	OK	OK	
	Hose reel box (Internal & External)	N/A	OK	OK	OK	OK	OK	NIL	OK	OK	
	Fire alarm devices	OK	OK	OK	OK	OK	OK	OK	OK	OK	
	Fire exit door	OK	OK	OK	OK	OK	OK	OK	OK	OK	
	Assembly point	OK	OK	OK	OK	OK	OK	OK	OK	OK	
	Manual call points	OK	OK	OK	OK	OK	OK	OK	OK	OK	
	Mega phone	N/A	N/A	OK	OK	OK	OK	OK	OK	OK	
	Self contained breathing apparatus	N/A	N/A	N/A	N/A	OK	OK	N/A	N/A	OK	

Checked by: C. Gopinath (C. Gopinath) 11/12/2017.

Verified by: 11/12/17

Fig. 2 Emergency Systems Healthiness check sheet

Table 1. Intial Position details

G Yard			
Area	Capacity	Today Status	Fill rate(%)
Batch & Hold	750	400	53.33
G Yard	650	596	91.69
D Yard	2100	1448	68.95

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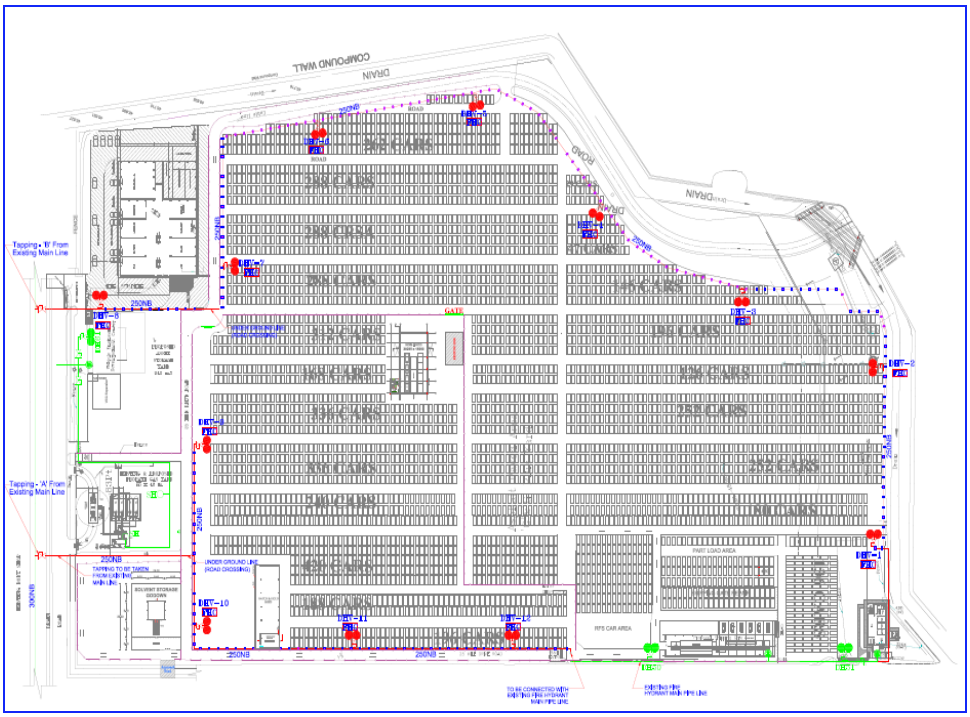

Fig 3. Initial position layout

IV. RESULTS AND DISCUSSIONS

This enables assessment of the adequacy of the fire prevention, fire protection and firefighting measures, Assessment of mitigation factors and Suitability of fire protection system in car parking storage yard. This report presents a review of fire protection system of car parking yard discussed in a car manufacturing plant. Safety concerns with their systems are discussed. Several tools are used such as Hydrant Mapping, SRA process for analysis purpose.

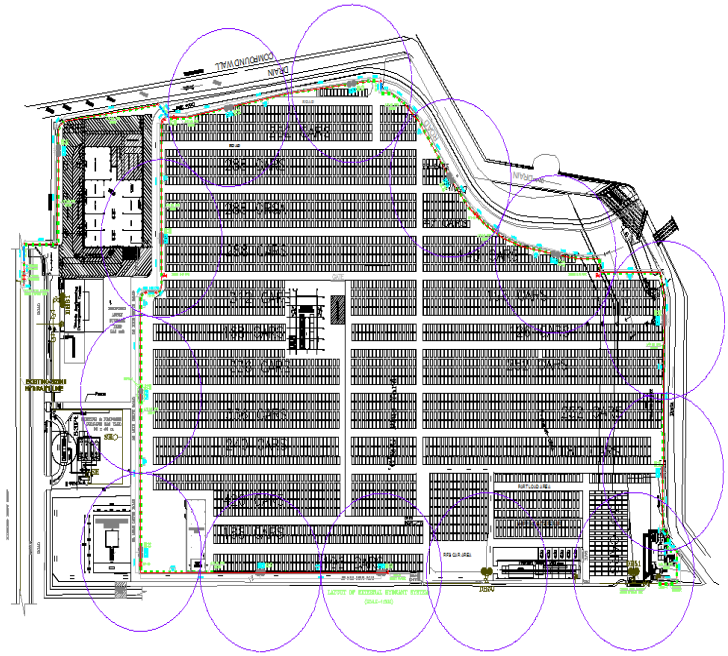

Fig 4.Hydrant - coverage mapping

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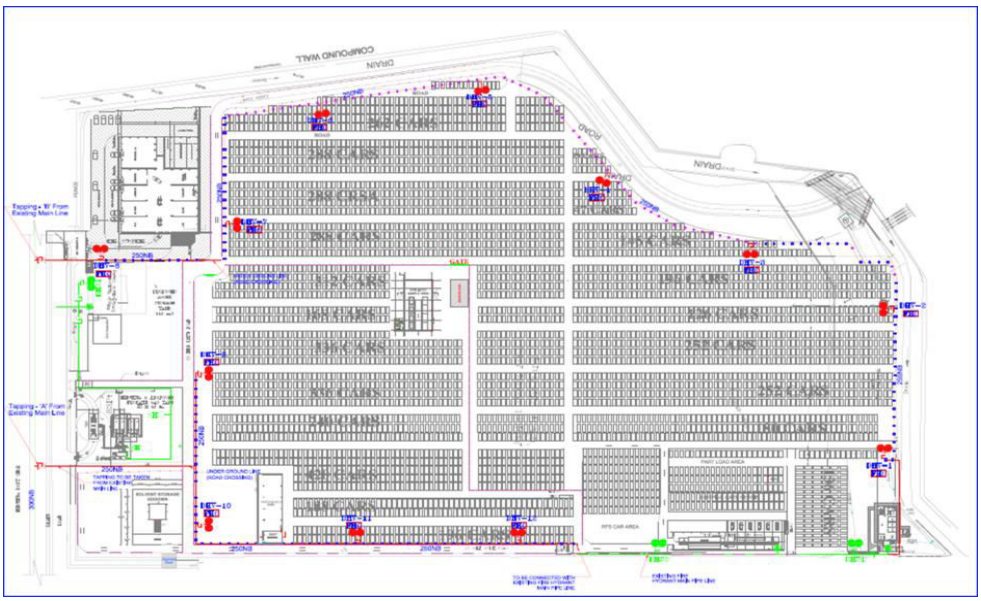

Fig. 5 G yard fire protection - Final layout

Process SRA

SRA No.: 3529
As at : 08 Apr 2017
Date SRA Raised : 03 Apr 2008

Process or Task : G Plus Yard - 1500 Cars
Workstation : G Plus Yard
Station Number : G Plus Yard
Plant : Ford India Assembly
Area : Plant .Eng
Section / Dept. : Projects

Location description : Gplus Yard
Design Stage : Current Process or on-line Facility
Project : No Specific Project
SRA Status : Current Valid SRA

Haz. No.	Hazard Description / Job Element	Comments by Originator	Initial RPN	Assignee	Action Plan, Due date and Progress Notes	Implemented Admin. Control/s	Latest RPN
				Anandbabu 26 Sep 2011	Discussed in RMC along with Sable,Santhosh,Satheesh.Team requested to review this for final RPN..		
				Xvelanganni M 11 Nov 2011	Discussed in RMC along with Sathyan , Sable,N. Prapu , Sridher, Satheesh.& Annadurai From safety To Be check this SRA will move to quality or not .		
				Kannadhsasan. 20 Dec 2011	This SRA was reviewed in RMC meeting along with Annadurai, Sathish,Srini & sable,Team requested to do SRA.		
				Anandbabu 0 Jan 2012	Discussed in RMC meeting along with Srini,Prabhu,Anna,Partha and Dass.Target date yet to be given.		
				KA NADHASA 25 Jan 2012	This SRA was again reviewed along with Mohan,1.Mat loading &un loading process was moved to near CAL area from G-3 YARD. 2.Dust bins were removed from parking slots.3.Container was removed from shipping gate entrance. 4.Drainage tanks height was reduced.All other points need to be closed.Based on this the RPN rate is 7.5		
				Anandbabu 8 Mar 2012	This SRA was again reviewed along with Sathish kannan - MP&L.All the hazards are remains open.		
				V.Bharathkuma 9 Mar 2012	The SRA was again reviewed by Thakoor along with Edison, All the identified hazards other than fire protection system was closed, Ashokbabu had agreed to provide fire protection system, , This SRA was binned to Plant Engineering.		
				Ramesh s 08 Apr 2017	This SRA was reviewed along with Kanagasabai-PE,Annadurai-Safety.Following things was done.1.In G yard -13 no's Double type fire hydrant line was provided as per fire bulletin 7 & 8 were complied.Based on this RPN revised as 3.		

7.5
0.0.0
27 JAN 2012

3
0.0.0
8APR2017

Fig. 6 SRA Process

A. TGW / (To be Improved)

1. Road crossing activity has been affected due to Launch activities. (VOME)
2. Storage of Pipe was not well organized.
3. VARDHA Cyclone recovery action caused unpredicted delay.

4. Finished floor level needs to incorporate with design drawing to avoid pedestal level variation.
5. Pre intimation, additional & alteration form submission to O&M Facility team.

B. TGR

1. Dec'16 Block closure periods were effectively utilized and 5 No's road cross activities done.
2. Proper alignment with concerned team helped flawless execution of work inside the yard.
3. Resource planning & day closeout meeting is most helpful.
4. On time permits & area clearance.
5. FRP Hose cabinets are used to increase the life time of the box & SS Door lock is fixed.
6. All Hose real male & female couplings & nozzle are made in Stainless steel to avoid theft issues.
7. Analyzed the need for No.of Pedestal through STAD; resulted in reduction of pedestal required for the pipe installation.

V. CONCLUSION

Thus the car parking yard fire protection system was initiated and discussed with plant engineering team. And further approval was got from ford project team. The car parking yard fire protection system was executed as per the designed layout. This project was to improve the fire protection system in car parking yard and reduce its economic losses. Finally, the Divisional Fire Officer has inspected the car parking yard. Thus the audit points were physically checked and closed.

REFERENCES

[1] IS 2190:2010 (Selection, Installation and Maintenance of First-Aid Fire Extinguishers)
[2] IS 13039:1991 (External Hydrant System – Provision and Maintenance)
[3] IS 15105:2002 (Design and Installation of Fixed Automatic Sprinkler fire extinguishing System)
[4] IS 2189:2008 (Selection, Installation and Maintenance ofAutomatic Fire Detection & Alarm System)
[5] IS 2175:1998 (Specification For Heat Sensitive Fire Detectors For Use In Automatic Fire Alarm System)
[6] IS 11360:1985 (Specification for Smoke Detectors for Use in Automatic Electrical Fire Alarm System)
[7] IS 3177:1999 (Code of Practice for Electric Overhead Travelling Cranes and Gantry Cranes other than Steel Work Cranes)
[8] NFPA 10 (Standard for Portable Fire Extinguisher)
[9] NFPA 13 (Standard for Installation of Sprinkler Systems)
[10] NFPA 14 (Standard for Installation of Standpipe & Hose System)
[11] NFPA 25 (Standard for the Inspection, Testing & Maintenance of water based fire protection systems)
[12] NFPA 72 (National Fire Alarm & Signaling Code)
[13] Ford Standard Bulletin 13 (Portable Fire Extinguisher)
[14] Ford Bulletin 7 (Water Supply Systems)
[15] Ford Bulletin 8 (Automatic Sprinkler System Installations)
[16] Ford Bulletin 14 (Fire Hose and Related Equipment)
[17] Ford Bulletin 27 (Inspecting, Testing & Maintenance requirements for Fire Protection Systems and Equipment)
[18] Ford Bulletin 27.12 (Procedures for Inspection and Testing of Fire Extinguishers)
[19] Ford Bulletin 27.15 (Procedures for Testing Heat Detection Systems)
[20] Ford Bulletin 27.16 (Procedures for Testing Smoke Detection Systems)
[21] Ford Bulletin 27.31 (Procedures for Inspection & Testing of Manual Fire Alarm Boxes)

[22] Ford Bulletin 32 (Fire Alarm Systems)
[23] The Factories Act, 1948
[24] Tamil Nadu Factories Rule, 1950.
[25] Jan K. Wachter, Patrick L. Yorio (2014) "A system of safety management practices and worker engagement for reducing and preventing accidents: An empirical and theoretical investigation"- Accident Analysis and Prevention. Vol 68, No 5, pp.117–130.
[26] Dong-Chul Seo (2005) "An explicative model of unsafe work behavior", Safety Science Vol 43, pp 187–211.
[27] Angelica M and Angelica M (2007) "Enhancing safety culture through effective communication" Industrial Health. Vol 11, No 03, pp.112-120.
[28] Ezrin Hani Sukadarin, Nurud Suria Suhaimi Norhidayah Abdull (2012) "Preliminary Study of the Safety Culture in a Manufacturing Industry" Industrial Health 2004,Vol. 2 No. 4
[29] Gong Lei Zhang Shuguang, Tang Peng, Lu Yi (2014) "An integrated graphic– taxonomic–associative approach to analyze human factors in aviation accidents" Vol 27, No.2, pp 226–240.
[30] Vivian W.Y Tam and Ivan W.H.Fung (2012) "Behavior, Attitude, and Perception toward Safety Culture from Mandatory Safety Training Course". Industrial Health, Vol 138, No.3, pp 207-213.