3. Liu Manping. Twelve Policy Suggestions for China to Achieve the "Carbon Neutrality" Goal. Power Equipment Management, 2021 (2): 23-25.
4. The State Council. Action Plan to Achieve Carbon Peak Before 2030 [EB/OL]. [2021-12-03]. http://www.gov.cn/zhengce/content/2021-10/26/content_5644984.htm.
5. China Sets the "Carbon Neutrality" Goal for 2060 (Excerpt) [J]. International Communication, 2020 (10): 63.
6. Xu Wei. Perfecting the Zero-Carbon Building Standard System to Support the Achievement of Dual-Carbon Goals in the Construction Sector. Standardization of Engineering Construction, 2023(1): 38-39.

Ядун Ма

Yadong Ma

ИССЛЕДОВАНИЕ ПО СТАНДАРТИЗАЦИИ СРЕДСТВ ОБЕСПЕЧЕНИЯ БЕЗОПАСНОСТИ ДОРОЖНОГО ДВИЖЕНИЯ

STUDY ON THE STANDARDISATION OF ROAD TRAFFIC SAFETY FACILITIES

Северо-Китайский университет водных ресурсов и гидроэнергетики, г. Чжэнчжоу, Китайская народная республика

North China University of Water Resources and Electric Power, Zhengzhou,China

В данной статье качество объектов безопасности движения в строительстве объектов безопасности движения рассматривается как тема исследования, стандартизация как носитель, строительство дорожных знаков, строительство дорожной разметки, строительство ограждений, строительство направляющих устройств, строительство противоослепляющих устройств для дальнейшей оптимизации качества строительства различных объектов безопасности движения инженерного строительства факторов качества для поочередного анализа, В то же время в процессе строительства будет учитываться наличие в настоящее время новых технологий, новых материалов, используемых при строительстве объектов, будет проводиться работа по совершенствованию строительства объектов безопасности движения в связи с тем, что объекты безопасности движения являются неполноценными, их качество не соответствует стандартам безопасности движения на автомагистралях, что

вызовет угрозу стандартизации объектов безопасности движения и мер по повышению уровня безопасности движения на автомагистралях.

In this paper, the quality of traffic safety facilities in the construction of traffic safety facilities as a research topic, standardisation as a carrier, the construction of traffic signs, traffic marking construction, guardrail construction, sight-guiding facilities construction, anti-glare facilities construction process to further optimise the quality of the construction of various traffic safety facilities engineering construction of quality factors for one by one analysis, at the same time will be the construction of the construction process of the current existence of new At the same time, the construction process currently exists in the new technology, new materials used in the construction of facilities, is committed to improving the construction of traffic safety facilities due to traffic safety facilities are incomplete, the quality does not meet the standards of highway traffic safety hazards caused by the standardisation of traffic safety facilities and measures to enhance the level of highway traffic safety.

Ключевые слова: безопасность движения; средства обеспечения безопасности движения; стандартизация

Keywords: standardisation; traffic safety facilities; traffic safety

Introductory

Highway safety facilities include traffic signs and markings, guardrails, sight-inducing facilities, anti-glare facilities, and traffic safety facilities can reduce the incidence of road safety accidents, attenuate the severity of accidents, improve driving safety, and enhance the road safety level. The construction quality of road safety facilities will not only have an impact on the traffic function of the road, but also endanger the safety of vehicles and pedestrians in the national highway and cause economic losses. Therefore, it is necessary to carry out standardised research on the construction technology of road traffic safety facilities.

Status of traffic safety facilities on national roads

In recent years, with the rapid development of China's economy and the acceleration of urbanisation, the number of road traffic safety accidents has been increasing. In the past highway traffic safety facilities project construction, due to the limitations of funds, technology and management capacity, it can be found that most of the construction of highway safety facilities still have large defects and deficiencies. Highway traffic safety facilities are set up arbitrarily, traffic signs and markings of the information instruction function is not specifically embodied, the safety protection role of safety barriers is not maximised, sight-inducing facilities, anti-glare facilities, isolation fences and other highway traffic safety facilities do not play an obvious role.

National Highway Traffic Safety Facilities Engineering Construction Technology

Traffic signs

Traffic signs are an important part of highway traffic safety. In the highway traffic safety facilities project, the correct installation and use of traffic signs can help vehicles and pedestrians quickly access to accurate road information, which can ensure the safe and efficient operation of the highway traffic system.

Traffic signs new construction technology

Due to the traditional traffic signs reflective film printing technology is not easy to maintain, the appearance of easy to damage and other issues, so the sign reflective film printing using the more advanced technology currently exists for the 3M sign reflective film printing technology.

3M sign reflective film printing technology technology is characterised by higher cost-effective, maintenance and repair costs are lower, easy to clean and traffic sign installation, durability and other characteristics of its simple construction process can be avoided in the traditional traffic sign reflective film printing technology in the human error.

Traffic sign construction process

Traffic sign construction technology process shown in Figure 1

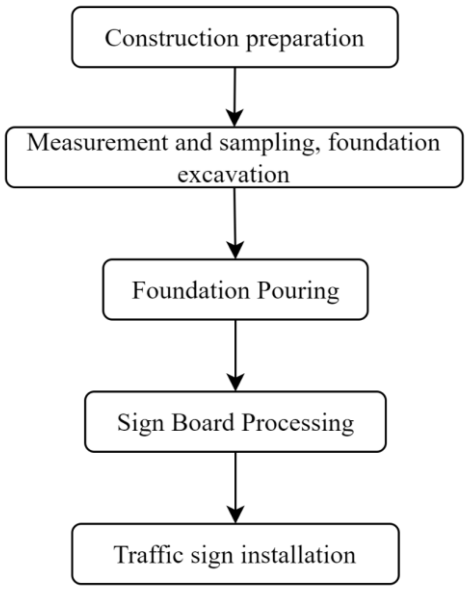

Figure 1 - Traffic sign construction flow chart

Before the construction of highway traffic safety signs, construction personnel need to correctly assess the construction site environment, observe and record the spatial independence of the construction site, whether there are obstacles, obstructions, electronic screens, surveillance camera equipment will make the traffic signs receive interference, but also pay attention to consult the relevant design drawings, observe and record the presence of pipelines, pipelines, and other facilities underneath the construction site, which will affect the traffic signage installation. Attention

should also be paid to the safety distance between the traffic signage and the road to avoid affecting the safety of driving.

Traffic signs are made of aluminium plate through welding process. Riveting process is made. The aluminium plate is released and cut, made by welding process and riveting process, and finally polished, cut, cleaned, dried and laminated. In the process of installing traffic signs, it should be done to ensure the safe operation of construction personnel, the firmness and correctness of traffic safety signs

Marking construction technology

In the highway traffic safety system, traffic marking also plays a very important role, can accurately provide traffic information for vehicles and pedestrians [3].

New marking construction technology and materials

The use of two-component marking paint can form a durable coating, and its cost-effective, construction process has a variety of different construction equipment, maintenance and repair is simple. The traditional marking construction technology of evenly spreading glass beads technology there are too much or too little spreading, reflective points less brightness, easy to fall off and other shortcomings. Adopt double spreading and double sowing construction technology can achieve uniform spreading amount, reflective points of good brightness, not easy to fall off.

Marking construction process

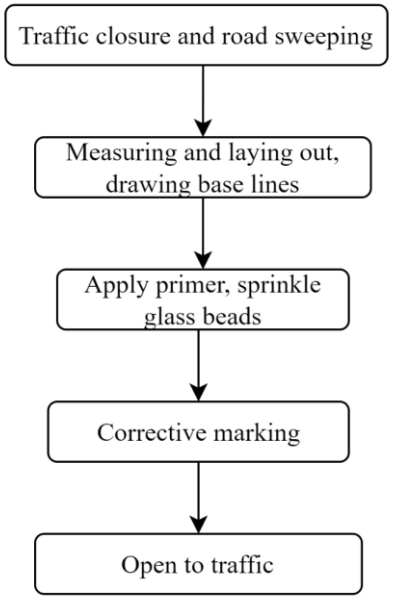

Figure 2 Marking construction flow chart

Keep the road surface clean and dry before construction, draw a clear bottom line and keep the same with the road linearity. During the construction process, choose environmentally friendly and reasonable hot melt materials, which should have the characteristics of fast drying and easy

moulding. In addition, the material should also have reflective, can help vehicles and pedestrians accurately identify traffic markings. Traffic marking design life should meet the service life of national highway traffic safety facilities, and traffic marking should have abrasion resistance, high temperature resistance, stability and anti-skid, to meet the heavy traffic national highway traffic demand. Construction personnel in the marking construction should be familiar with the drawings, accurate sampling, master familiar operating skills and operating standards, after the construction, should be timely check the construction of the spraying effect, unqualified places timely correction, clean up the construction area of road pollution.

Guardrail construction technology

New type of guardrail

Traditional waveform beam guardrail pollution problems, the use of epoxy zinc-based polyester composite coating in the guardrail installation using heavy anti-corrosion multi-layer powder electrostatic spraying process, epoxy zinc-based polyester composite coating steel guardrail is a green and low-loss materials, and the environment with the beautiful colour, with a good view of the line of sight inducing effect, strong adhesion force does not peel when the force, durability is good, and can effectively mitigate traffic accidents brought about by the Accident injury.

Wave plate guardrail construction process

Waveform beam guardrail construction process as Figure 3

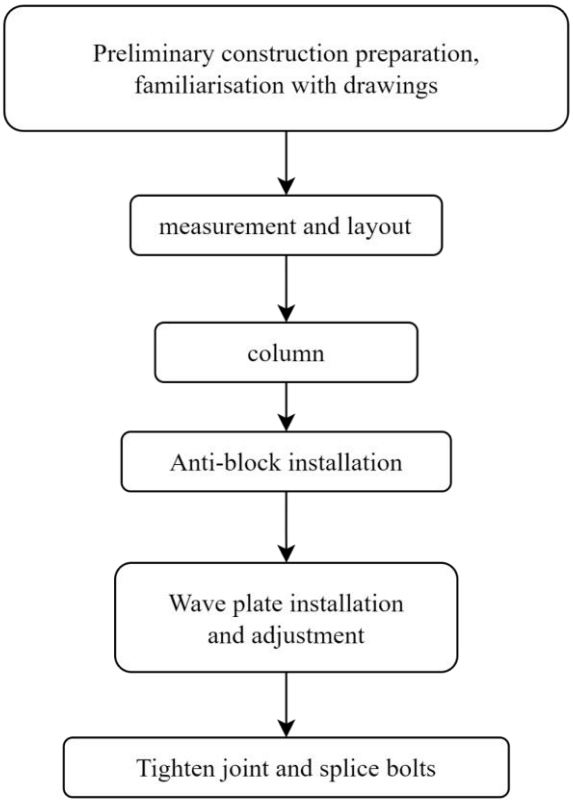

Figure 3 - Corrugated beam guardrail construction flow chart

(1) Use hydraulic piling machine to construct along the direction of traffic, align the column height marking to drive the column, use level meter and latitude and longitude meter to observe at any time in the process of driving, take the centre of marking on the column as the reference point, adjust the change of height and verticality of the column at any time, correct the problem in time to prevent deviation and over depth, and control the deviation of verticality of the column to be within ±5mm/m, and control the deviation of the height of the centre of guardrail beam to be within ±20mm/m. Control within ±20mm/m. When piling into the column, pay attention to the galvanised layer of the column shall not be damaged. The bottom of the hydraulic pile driver should be specially treated to prevent oil leakage from the pile driver from polluting the asphalt. If driven in too deep, it is forbidden to pull out part of the column for correction. The column must be pulled out completely and the foundation should be compacted immediately after pulling out. It is forbidden to cut or damage the columns if they cannot reach the required depth, and care should be taken not to use damaged columns. After the construction is finished, use the guardrail column buried depth detector to detect the depth of the column buried.

(2) Keep the columns installed vertically during construction to ensure that the spacing is consistent with the design requirements. The use of latitude and longitude, level and other detection tools, adjust the test column vertical distance, verticality and height line. For columns that do not meet the standard, use the pile puller to pull it out completely, adjust the column spacing and then again into the construction.

(3) Anti-block and bracket should be fixed between guardrail plate and column by connecting bolt. Adjust the anti-block and bracket to the exact position and then tighten the splicing bolts.

(4) Waveform beam guardrail with protection level SA, SS and HB and waveform beam guardrail with protection level SAm, SSm and HBm shall be installed with the upper column at the same time when installing anti-blocking blocks, and the line shape shall be the same as the lower column. For central divider guardrail with spacer beams, the spacer beams shall be installed after the columns are accurately positioned. Before the guardrail plate is installed, the connecting bolts between the spacer beam and the column should not be tightened prematurely.

(5) The guardrail plate shall be spliced into a longitudinal beam along the travelling direction by splicing bolts, and the anti-block, bracket, spacer beam and guardrail plate shall be combined by connecting bolts. It should be noted that the splicing bolts adopt high strength bolts in accordance with the requirements of design standards.

Concrete guardrail construction process

Concrete guardrail construction process shown in Figure 4

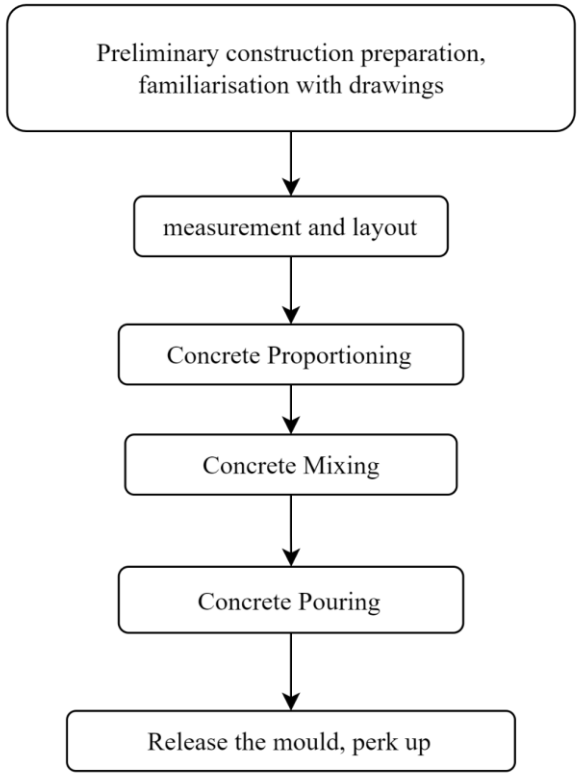

Figure 4 - Concrete guardrail construction flow chart

(1) Concrete guardrail construction should be in accordance with the design drawings and construction specifications for the construction of sampling, and the road line to maintain consistency, good site preparation, shall not damage the pipeline and pipeline facilities.

(2) Concrete guardrail template should be in accordance with the standard design and construction specifications to select the thickness of not less than 4mm of the new high-strength steel template, in accordance with the design drawings and construction specifications for the construction of steel template processing.

(3) The steel reinforcement and embedded parts should be fixed and installed according to the design drawings and construction specifications, and the concrete should be poured after passing the inspection.

(4) The ratio of concrete should be mixed evenly and fully by machinery according to the requirements of construction specifications. After the mechanical mixing is completed, if the concrete meets the requirements of design specifications, it needs to be poured at one time. After completion, cover with geotextile and sprinkle water to maintain.

(5) in the concrete foundation to meet the design requirements, the concrete guardrail blocks can be lifting construction, but should ensure that its concrete strength is not less than 70% of the design strength. The cast-in-place guardrail needs to be completed before the construction of asphalt top layer.

2.4 sight-guiding facilities construction technology

Line of sight inducing facilities in the main most widely used for the merging sign, linear inducing signs and contour markers, line of sight inducing facilities can ensure that vehicles and pedestrians travelling at night, through the reflection of the lights emitted by the vehicle in time to grasp the road information of the road in front of them, to ensure the safety of night driving [3].

New materials for sight-guiding facilities

In the line of sight guidance facilities using new fluorescent materials, the main colours include fluorescent yellow, fluorescent orange and fluorescent yellow-green. Applying fluorescent materials to the sight-inducing signs can greatly improve the sight-inducing effect and effectively reduce the accident rate.

Construction process of sight-guiding facilities

Contour marking construction process has the first pre-preparation work, and then the construction area measurement and sampling and excavation of the foundation, foundation excavation is completed after pouring concrete, column processing and installation.

Anti-glare facilities construction technology

The main function is to avoid the vehicle from the opposite direction by the vehicle driving lights irradiation caused by the dazzling impact of the driver, so as to ensure the safety of vehicles driving at night [3].

New anti-glare facility materials

The anti-glare facility adopts a new type of non-welding plug-in frame anti-glare plate, the new type of non-welding plug-in frame anti-glare plate features a thin sheet of galvanised strip steel, simple galvanising process and improve the anti-corrosion effect of anti-glare facilities, reduce the cost in the production, transportation and installation, and improve the suitability of the surrounding environment so that the anti-glare facility has a more superior use of the effect.

Construction process of anti-glare facilities

Construction process: production and transport of anti-glare board → construction area sampling → drilling → bracket installation → anti-glare board installation

Standardised recommendations for the construction of road traffic safety facilities

Planning standardisation

In the process of planning and preliminary design of traffic safety facilities must follow the principle of highlighting the key points and leading the whole situation [7]. According to the role of different roads in the road network, combined with topography and geology, climate environment, human factors, to standardise the programme to carry out construction. In order to reduce the cost of inputs, so as to cancel part of the safety facilities; also not in order to pursue the grade, choose expensive facilities for construction. Because of the lack of a systematic approach to highway

network planning, it is necessary to pay attention to the coordination of planning, focusing on the harmony of the safety facilities system and the road network system.

Design standardisation

Traffic safety facilities design procedure is mostly after obtaining road design documents, in accordance with the climatic environment of the road section, geographic characteristics, investment funds, choose the appropriate safety facilities structure [7]. At the same time, reference to national standards, norms design content and methods to ensure the standardisation of safety facilities. In order to ensure the standardisation of design, should reduce the human factor, the impact of design experience, can not ignore the safety of safety facilities and standards. Traffic safety facilities should meet the requirements of the relevant design rules. For the same type of traffic signs, choose the same type of sign layout; the layout should be simple and clearly orientated; for the same cantilever and gantry support structure, the specification and height of the border should be unified. The width and height of the text should follow the standard requirements.

Enhance the informatisation of traffic safety facilities

The standardisation of traffic safety facilities has a strong effect on the promotion of traffic safety [7]. The rapid development of Internet technology focuses on the information construction of traffic safety facilities and the establishment of information management systems to ensure the standardisation of traffic safety and effectively deal with traffic safety hazards. Parameter information such as components, attributes and names of traffic safety facilities are input into the big data platform system, which is used as reference data to ensure the conversion effect of safety equipment and digital technology, and to enhance the construction standardisation with science and technology. Focus on communication with administrative departments to improve and update database information to highly match road conditions in order to enhance the construction efficiency of traffic safety facilities.

Conclusion

Highway traffic safety facilities on the highway traffic safety is of great significance, standardised research traffic safety facilities construction technology can be a good way to improve the road safety level, to improve the previous highway traffic safety facilities existed in the information instruction is not sufficient and security hidden danger problem, the construction technology technology, standardised control of the construction process can improve the efficiency of the construction of traffic safety facilities and the level of construction.

REFERENCES

1. Ye Jianwei. Quality Management and Control of Highway Traffic Safety Facilities Project[C]//Chinese Highway Society Maintenance and Management Branch. Proceedings of the

Twelfth Annual Academic Conference of the Maintenance and Management Branch of the Chinese Highway Society.2022:345-347.

2. Liu Weiguang. Construction quality control of highway traffic safety facilities[J]. Traffic World,2021(23):9-10.

3. Zheng Rui. Research on the construction quality of highway engineering traffic safety facilities[J]. Heilongjiang Traffic Science and Technology,2020,43(11):157+160.DOI:10.16402/j.cnki.issn1008-3383.2020.11.084.

4. Zhang YM . Exploration on Strengthening the Construction of Safety Facilities of Public Road Traffic Engineering[J]. Famous City Drawing, 2020 (5): 63. [4] Ma Mingjia . Highway Traffic Safety Facilities Engineering Construction Technology and Discussion [J]. Building Materials and Decoration, 2018 (28): 265.

5. Jiang Jinping . Highway traffic safety facilities construction technology points and quality control exploration [J]. Chinese science and technology journal database (full text version) engineering technology, 2017 (1): 137.

6. Liang Daiwei, Wu Ke Aman, Tang Haiji, etc. . Design and Implementation of Dynamic Automatic Generation System for Temporary Traffic Safety Facilities Layout Scheme in Highway Operation Area[J]. Highway, 2022(6):196-201

7. Shang Yongxin . Discussion and Application of Intellectualisation Based on Management of Traffic Safety Facilities on Urban Roads[J]. North Traffic, 2022(4):84-86.

8. Meng Liqiang . Influence of Urban Road Traffic Safety Facilities on Traffic Safety and Specific Countermeasures[J]. Shanxi Transportation Science and Technology, 2021(5):78-80.

Weishu Wang, Weihui Xu ,Yuzheng Wang ,Yanshang Gao, Renjie Li , Jie Wang

STUDY ON THE HEAT TRANSFER CHARACTERISTICS OF DRY ICE SUBLIMATION SPRAY COOLING WITH DUAL NOZZLES

North China University of Water Resources and Electric Power, Zhengzhou, China

A new dual-nozzle dry ice sublimation spray cooling numerical calculation model was designed to address the thermal management of high heat load electronic devices. A numerical test was conducted using the CFD two-phase flow solver to investigate the dry ice sublimation spray cooling process in gas-solid two-phase flow. The effects of different spray tilt angles, nozzle inlet velocities and dry ice occupancy ratios on the heat transfer characteristics of dual-nozzle variable-angle dry ice sublimation spray cooling were investigated. The results show that the dry ice sublimation spray cooling performance increases with increasing nozzle inlet velocity and dry ice ratio and decreases with increasing nozzle inclination under the conditions of constant height of the nozzle center from the upper surface of the heat source and heating power of the simulated heat source. The dry ice phase distribution on the upper surface of the heat source was higher when the dry ice percentage was closer to the longitudinal symmetry axis. The temperature of the inner