

Discussion on the Safe and Guaranteed Access of Interchange Widening in Reconstruction and Extension of Highway

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Abstract: In the process of reconstruction and extension of highways, the most important thing is to ensure that the overall level of the widening of interchanges is comprehensively improved to ensure safe traffic. However, due to the heavy and difficult tasks in the widening of interchanges, higher requirements are put forward for the construction quality of the project. In the actual construction of the project, it is necessary to actively analyze and explain the specific construction of the interchange widening project to ensure that the improvement level of the interchange widening in highway reconstruction and extension project is effectively upgraded. This paper gives a detailed introduction to the main construction technology for interchange widening project, clarifies the technical points of safety and guaranteed access, and proposes corresponding safeguard measures to ensure the comprehensive upgrade of the construction quality and standard of interchange widening in highway reconstruction and extension.

Key words: Expressway reconstruction and extension project; Widening of interchange; Safety and guaranteed access

Publication date: March, 2021

Publication online: 31 March, 2021

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The interchange widening project is the top priority of the highway reconstruction and extension. In the actual construction process, there will inevitably be a conflict between the new and old construction at the junction of the ramp and the main line. Moreover,

the safety of the construction of bridge superstructure will also be affected by the traffic flow and natural factors, which will hinder the construction progress, and the interchange widening project will cause the site to be very narrow rendering large-scale equipment unable to be used. In order to effectively avoid hidden dangers of safety incidents, it is necessary to conduct a comprehensive analysis on the characteristics of the construction of the interchange widening project in a timely manner, and to formulate corresponding construction technical plans based on the actual situation of the project.

1 The main points for the safe and guaranteed access construction of the interchange widening project

Most of the interchange widening projects are connected with toll stations, some toll stations do not relocate while some have to. Regardless of which connection method is used, the overpass or culvert channel in the interchange needs to be managed focusedly. As interchange widening project has the characteristics of complexity, variability, coordination, continuity, and interference, the interchange reconstruction in highway reconstruction project needs to strengthen the safety management of the construction site. However, due to the influence of climatic conditions, geological conditions, hydrological conditions, geographical conditions and other related factors, the highway reconstruction and extension projects are more complicated^[1]. At the construction site, due to the very large fluidity of materials, equipment and construction period,

the difficulty in safety management of highway reconstruction and extension projects will also elevate significantly as the project continues to introduce various new materials, new equipment and new processes. In the interchange reconstruction and extension project, different types of work are required in coordination with each other as it involves roadbed construction, bridge and culvert construction, pavement construction, safety protection, construction, electrical and mechanical construction, and greening, etc. In addition, there are many high-altitude electrical operations which require coordination and cooperation between different departments to ensure that the construction progress is effectively controlled, minimize conflicts caused by cross-operations, and reduce the incidence of safety accidents.

There are many segments involved in the interchange widening project. The entire construction cycle is very long, any problem in any segment is likely to cause interference to subsequent work and cause major safety incidents. The interchange widening project needs to ensure the normal operation of the traffic lines and avoid obstructing the traffic. Therefore, there are obvious safety hazards. The entire highway has a lot of traffic and is easily interfered by factors of vehicle driving.

2 Construction technology for widening of interchanges in highway reconstruction and extension project

2.1 Hoisting of prefabricated beams and slabs

It is necessary to strengthen the safe hoisting of prefabricated girder slabs in the safe and guaranteed access construction of the interchange overpass project. When installing at the first hole, two 50t cranes can be used in coordination with each other. When the first 50t crane installs the 8th to 9th prefabricated beam slabs in the gap of the first hole, the crane must be moved to a suitable position until the installation of the first hollow beam slab is completed. Each bracket of the crane can use the four 15×15cm square wooden support, and the safety and guaranteed access work of traffic control and vehicle directing should be carried out well^[2].

2.2 Construction of the junction between the old ramp and the main line in the interchange area

During the extension of highway, the main points

of the construction at the junction of the old ramp and the main line are inevitably involved. Therefore, proper treatment must be carried out on the entire roadbed, and some sections of the old ramp must be strengthened to achieve vehicle flow diversion. Reduce the interfering factors of traffic flow, and finally carry out the construction of the junction of the toll station and the old ramp. In the construction of new and old roadbeds, it is necessary to fully excavate strictly according to the overall thickness of the pavement structure as it needs to be destroyed, and then backfill the earth. After the construction of the new ramp is completed, the guardrails need to be removed, and the opening of the central sub-belt needs to be rebuilt and displaced to ensure the efficiency of the connection between the interchange ramp and the main line, and to ensure that vehicles are cut off to protect the normal passage of vehicles.

3 The main measures to speed up the safe and guaranteed access of the interchange

3.1 Organizational measures for safety and guaranteed access

In order to ensure the smooth completion of the junction between the interchange ramp and the main line and avoid affecting normal traffic, it is necessary to do a good job in manpower preparation, time preparation, and preparation of the format of guaranteed access in terms of personnel preparation. The entire project department has to set up a specialized team for safety and guaranteed access, select a safety engineer with rich experience as the team leader and equip the team with relevant personnel such as the technical group and coordination group etc^[3]. During the guaranteed access period, all construction adopts the format of closed-construction, and the interchange overpass adopts intermittent release traffic control. The intermittent construction adopts route changing, traffic control or continuous construction as the format of safe and guaranteed access at the heart-brain ramp interchange junction and the toll station. During the safe and guaranteed access construction, it is necessary to increase the construction management of the safe production responsibility system. This is also the key to all safe production management systems. The safe production responsibility system needs to strictly follow the guidelines for safe

production. Responsibilities of persons-in-charge, functional departments, and job positions at all levels must be clarified, and work safety tasks must be broken down to specific project leaders of relevant units.

3.2 Strengthen organizational leadership

In order to improve the level of coordination and overall planning during the safety and guaranteed access stage, it is necessary to establish a leading group for overpass dismantling in time, and group the toll substations to ensure safety and guaranteed access. Realize unified command and unified dispatchment to ensure the smooth development of the interchange widening project. It is also necessary to actively establish a temporary traffic command center to coordinate command and overall planning of traffic factors to ensure that the responsibilities and labor division of the teams in each zone are clarified. The construction team must be carefully arranged, including the dismantling group, the transportation group, the segmentation group and the clearing group. Each team member must closely cooperate with other team members to ensure the orderly management of the entire construction team. During the construction management stage, strictly implement the requirements of refined management, and strengthen the effects of target management and quality management. At the same time, establish a typical model, adopt an incentive mechanism to reward the good and punish the bad, and re-evaluate the actual operation at the construction site to effectively reduce the negative emotions of the construction workers.

3.3 Technical measures for safety and guaranteed access

In the development of safe and guaranteed access construction technology, we must first actively strengthen the technical disclosure of the plan, especially the full training of operators, so that they can master the correct construction technology, and ensure that their job positions are fixed, which is forbidden to change at will. Effectively implement the construction technical disclosure system to ensure the accurate and timely demolition of the overpass. In addition, it is necessary to plan the temporary site zoning well, because the construction site area is narrow, the construction tasks are too concentrated, and cross-operation is very prominent. In view of this

situation, it is necessary to strengthen the reasonable zoning analysis of different sites. Safety signs must be placed strictly in accordance with regulations. After the application is approved in advance by the Highway Administration Department, relevant safety warning signs shall be put up on the highway, and an expert shall be responsible for traffic command. All construction workers need to wear reflective vests on the old highway emergency parking strip to catch the attention of drivers^[4].

It is necessary to focus on strictly following the regulations of continuous construction and intermittent release during the mechanical construction at the junction between the old ramp of the toll station and the main line. The platform security is provided by the guaranteed access staff in coordination with traffic management 24 hours a day, and it is never allowed to affect the normal passage of vehicles. At the off-ramp, a striking slogan has to be put up to remind passing vehicles to slow down appropriately. Conical anti-collision buttresses need to be put up at the toll stations in the interchange area to make guidance signs, and construction management should be arranged for the junction to ensure the smooth passage of vehicles.

4 Conclusion

The widening of interchanges in the reconstruction and extension of highways is critical to ensuring safety and guaranteed access. Scientific and patient guidance is required during the construction process to ensure that all segments are fully implemented and improve management quality. In the safety management of construction sites, it is necessary to actively carry out publication and education work, through the exhibition of books and materials on safety production, so that the majority of construction personnel can master the rules and regulations of safe production. In addition, specialized operators are regularly trained to upgrade safety management experience to modern scientific management concepts. Only by continuously improving the quality of management can we ensure the smooth development of safety and guaranteed access work.

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