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Roadbed Pavement Construction Technology of Road and Bridge Transition Section

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Abstract

The acceleration of urbanization has increased the number of vehicles on road traffic, bringing unprecedented pressure to the road surface and gradually increasing the quality requirements for roads and bridges. However, various quality problems have appeared in the construction of roads and bridges, seriously affecting people's daily lives. From the actual situation of road and bridge engineering construction, the subgrade pavement of the road and bridge transition section is more prone to quality problems, especially the appearance of uneven settlement, which seriously threatens road driving safety. Therefore, this paper combines the problems of subgrade pavement construction in the transition section of roads and bridges and analyzes the strategies for optimizing the construction of subgrade pavement in the transition section of roads and bridges.

Keywords

Road and Bridge; Transition Sections; Roadbed Pavement; Construction Techniques.

1. Introduction

Today, infrastructure construction is becoming more and more perfect, the number of roads and bridges is increasing, the area covered continues to expand, and at the same time, the quality problems of road and bridge construction have begun to emerge more and more, which is highlighted by the serious wear and tear of the road and bridge pavement under the increase of vehicles. The uneven settlement of the road surface, etc., and the emergence of these problems have affected road traffic construction. The road traffic safety accident will also be caused in severe cases. From the point of view of each road and bridge construction problem, the construction of the road and bridge transition section is the section where there are more problems; if the smooth connection is not realized in the position of the road and bridge transition section, the damage to the vehicle is increased, and it is easy to cause safety accidents when the vehicle is driving at high speed. To this end, this paper starts with constructing the road and bridge transition section. It discusses the problems existing in the construction of the road and bridge transition section and how to improve the construction quality of the road and bridge subgrade pavement.

2. Problems Existing in the Construction of Roadbed and Pavement in the Transition Section of Road and Bridge

2.1. Flatness does Not Meet the Specified Standard

The flatness of the transition section of the road and bridge directly determines the overall quality and use effect of the whole highway bridge connection section. For this reason, in the construction process of the transition section, the technical personnel need to strengthen the importance of the leveling work of the bridge transition section[1]. However, from the actual situation of construction, some road and bridge transition sections still have the problem of low

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flatness, and the reason for this problem generally includes two points; the first point is that the foundation of the transition section is not handled correctly, and the bearing capacity of the foundation does not meet the requirements of the standard and the specification or the subgrade filling is not compacted in place according to the requirements and the settlement occurs. The second point is that the pavement concrete material paving and compaction technology are not adequately operated, which reduces the smoothness of the pavement.

2.2. Bridge Lap Plate Connection Difference

First, there is a large gap between the bridge lap plate and the back wall; the main reason is that the construction unit does not use qualified filling materials or the compaction process is not suitable, and uneven settlement occurs, which will make the lap plate connection appear expansion and contraction gaps, and seriously endangers the stability and safety of road and bridge[2]. Second, the slope of the lap plate is set unreasonably, and the longitudinal slope factor of the road and the settlement difference between the roadbed and the bridge are not comprehensively considered. Thirdly, the connection anchorage mode of the lap plate and abutment is unreasonable, and the connection is not good.

2.3. Road and Bridge Transition Section Pavement Appeared Damage and Fracture Phenomenon

The roadbed is an important foundation for constructing the whole road and bridge. However, from the actual construction situation, most of the road and bridge pavement have subgrade construction problems, which causes the settlement and collapse of the whole road and bridge and seriously damages the road pavement. After investigation and research, it is found that the reasons for the above phenomenon are as follows: first, the soft soil foundation is not treated or is not in place in the construction process, so the bearing capacity of the foundation cannot meet the requirements. Second, there is a problem with the quality of the fill. When the construction unit selects the backfill material, it does not carry out the necessary test and detection work, so the inferior soil in the material reduces the quality of the material, causing problems such as settlement and collapse. Thirdly, the compaction is not in place, the construction is not strictly by the backfill compaction process of the back of the platform, and the degree of compaction is insufficient, resulting in settlement.

3. The Optimization or Roadbed and Pavement Construction Technology in the Transition Section of Road and Bridge

3.1. Reasonable Selection of Filling Materials to Improve the Quality of Subgrade and Abutment in Transition Section

For the transition section of the road and bridge that is prone to settlement, the road and bridge construction believes that it is necessary to carry out an accurate survey of the local foundation and select a suitable filling method to strengthen the roadbed and abutment according to the survey results[3~4]. The following factors must be considered when selecting filling materials: first, according to the local previous construction experience, the number and probability of settlement at the abutment position to reasonably select the filling materials to ensure that the materials meet the specifications and use requirements. Second, there is a settlement problem after the abutment compaction work. In that case, it is necessary to choose a more permeable filling material for the construction to ensure that the water in the roadbed is discharged in time.

3.2. Reasonable Setting of Road Slab

Based on the construction problem of the transition section of the subgrade pavement caused by the irrational use of the erection plate in the construction of roads and bridges, the

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construction personnel need to strengthen the reasonable setting of the erection plate in the construction process[5]. First, set the reserved reverse slope to ensure that the elevation of the lap plate and the abutment gap joint is consistent. Second, when designing the slope, it is necessary to fully consider the settlement difference between roads and bridges, determine the settlement difference, and reserve the reverse slope to ensure the smoothness of the route profile. Thirdly, the anchorage of the lap plate and the abutment is reasonably selected, and the anchorage mode of the lap plate and the abutment in the horizontal direction is selected after comprehensively considering the actual situation of road and bridge construction. Fourthly, considering the influence of the shoulder on the lap plate, when setting the lap plate, the shoulder that meets the requirements needs to be built according to the actual situation of the roadbed pavement construction of the road bridge transition section to improve the stress condition of the whole lap plate effectively.

3.3. Do a Good Job of Subgrade and Pavement Drainage in the Transition Section

From the actual situation, an important factor that causes the instability of the roadbed in the transition section of the road and bridge is the increase in the water content of the roadbed. For this reason, in constructing the roadbed pavement in the transition section of the road and bridge, the relevant personnel need to do the drainage work of the roadbed pavement of the transition section[6]. At the same time, in the construction process, the ditch can be strengthened with the help of concrete prefabricated slabs and slurry sheet stones, and the blind ditch or drainage ditch can be reasonably set based on the original foundation. In addition, it is necessary to do a good job of waterproofing and drainage of horizontal and longitudinal roads and bridges to avoid rainwater inflow and clean up the stored water in time with the help of pumps and canals.

3.4. Optimize the Construction Technology of Road and Bridge Transition Section

First, when carrying out large-scale construction of subgrade pavement, it is necessary to do a good job in the preliminary test work, reasonably select the construction process parameters, and choose the most appropriate way to carry out construction. Second, in the process of road and bridge subgrade pavement construction, the construction personnel not only need to be proficient in the corresponding construction technology and construction skills but also need to reasonably select the comprehensive ratio of embankment filler, water content setting, filling flatness and thickness and other information, and ensure the rationality of the selection of embankment filler in the transition section of the whole road and bridge by optimizing this information.

3.5. Strengthen the Maintenance of Roadbed in the Transition Section of Road and Bridge

The construction of roadbed engineering has broken the balance of the previous strata to a certain extent. Compared with the past, the road and bridge roadbeds must bear more loads. Therefore, it is necessary to strengthen the maintenance of the roadbed during construction to ensure that it can better bear the load [7].

At present, the commonly used method for roadbed maintenance is the stonework protection method. This method is mainly for slope protection on different roadbed slopes. The embankment slope generally uses concrete prefabricated blocks for slope protection. The cutting slope is the application of arched skeleton slope protection, etc., and the necessary protection measures are needed for the slope susceptible to erosion.

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4. Conclusion

To sum up, the construction of roadbeds and pavement in the transition section of road and bridge is deeply related to the construction of the whole project, and it is also the key to ensuring the safety of road vehicles. Therefore, in the new historical period, it is necessary for relevant personnel to strengthen the attention to the construction of the transition section of roads and bridges and to take corresponding measures to solve the problems existing in the construction of subgrade and pavement in the transition section, to promote better the development of the construction and construction of the whole project.

References

[1] Zhou Mingliang. Analysis of Key Points for Road and Bridge Transition Section Roadbed and Pavement Construction [J]. Construction & Design for Engineering, 2024, Vol. 2 (04), p172-174.

[2] Ge Yanshuo. Construction Technology of Subgrade and Pavement in Settlement Sectionof Road and Bridge [J]. Construction & Design for Engineering, 2023, Vol. 4 (08), p213-215.

[3] Yan Xu. Exploration of Construction Technology for Roadbed and Pavement of Road and Bridge Transition Section [J]. Construction & Design for Engineering, 2024, Vol. 11 (21), p185-187.

[4] Liu Xiaoli. Subgrade and pavement construction technology of road and bridge transition section [J]. TranspoWorld, 2018, Vol. 10 (25), p112-113.

[5] Zhang Hanwen. Analysis on the construction technology of subgrade and pavement in the transition section of road and bridge [J]. Gansu Science and Technology, 2020, Vol. 36 (13), p99-101.

[6] Wei Wei. Subgrade and pavement construction technology of road and bridge transition section [J]. China Plant Engineering, 2020, Vol. 7 (14), p171-172.

[7] Zhao Huajia. Construction technology of subgrade and pavement in transition section of road and bridge [J]. Communications Science and Technology Heilongjiang, 2017, Vol. 40 (07), p26+28.