China and The United States Security And Disaster Rescue Coordination Workshop

Karamay to Tacheng wind blowing snow control technology on the highway

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Catalogue

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1.1 Project background

Karamay - Tacheng into the highway is the national high speed highway network planning, lianyungang to huoerguos highway link, as well as the xinjiang "two vertical and three horizontal ring eight channel" is an important part of the skeleton channel three main highways, is the 12th five-year plan of major projects in xinjiang, line the total length of 217.714 km.
Route corridor with passing into old tuyere-based, wind area. The region's largest stable snow thickness up to 1.26 meters, maximum wind speed 41 meters per second, something caused by special terrain two-way alternate wind, wind and snow disasters.
1.3 Route corridor with snow

Every winter snow disasters is very serious, the region, resulting in traffic, vehicle were buried, casualties, greatly affecting the local people’s production and living.
2 The snow disaster research

The project field research stage, in view of the storm deposits and low visibility, carried out within the route corridor with wind speed and direction, move the snow observation, section snow, disaster geomorphologic 3 d scanning, snow damage aerial photography and so on a series of work, preliminary found out the snow hazards along the highway.
2 The snow disaster research

In December 2012, aerial photography
3 The road snow damage distribution

This road is located in the mountains high, the terrain ups and downs is bigger, more excavation mountain; Dominant wind direction for the west wind, wind direction and route Angle of 30 ° ~ 60 °; Affected by the west wind, lee deposition seriously, the largest snow thickness of 1.8 m. The leeward sedimentary sections of harm is serious.

A contract period: K65+000～K79+544.5
3 The road snow damage distribution

The second contract section: K83+618 ~ K147+903.35

This section of the total Bach mountains to the north, and the summer mountain, for the day to add 'in southeast mountain, form the opening in the west and low in the middle of the basin, the low terrain northeast Gao Xina, elevation between 470 ~ 1800, local road broken terrain, influenced by things two-way wind, snow resistance, visibility damage is serious.
This road is located in tal Bach taishan with crookshanks - ur karma between sal mountain, belong to the tower of basin tectonic on tuscaloosa - EMin mountain sag area, open terrain, the terrain ups and downs, wind direction and route Angle of 5 ° ~ 10 ° or so, the largest snow thickness of 1.2 m, the leeward sedimentary sections of harm is serious.
4.1 Wind blowing snow governance
overall train of thought

Through the field observation and survey data, combined with domestic and international highway snow damage prevention and control technology, comprehensive analysis g - tower road snow damage prevention and control of key technologies as follows: (1) road snow disaster prevention technologies; to select (2) the reasonable embankment height and cross section design; (3) roadside engineering protection measures; (4) monitoring and early warning and emergency security system.
4.2 Road snow disaster prevention technology to select

Route of the project is located in the old tuyere-based, wind area, route inevitably through the wind and snow area, the early stage of the project, after many field reconnaissance, the route course arrangement on flat, open excavation or avoid leeward slope sections such as easy to snow. K116 ~ K122 conditions particularly difficult road construction, and strive for the shortest route through, and appropriately increase the height.
4.2 Road snow disaster prevention technology to select

Route optimization - bridge + tunnel engineering

K79 + 305 - K80 + 270 road through the mountain area, the excavation depth of 24 - 34 m. This road is located in the snow area, excavation cutting inevitably cause storm deposits, by comparison, the bridge and tunnel scheme.
4.2 Reasonable embankment height and cross section design

Subgrade optimization—Separated subgrade

- Cancel the zoning in the fence
- Cancel the roadside guardrail
- Cancel the anti-dazzle facility

Separated Subgrade Strength
4.2 reasonable embankment height and cross section design

Subgrade optimization - engineering measures

Snow flow can smoothly through the pavement, cause no Yang xue, improve visibility
Open a streamlined, cutting type embankment, not only ensure the snow flow smoothly through, and avoid the road buried by snow.
4.2 Reasonable embankment height and cross section design

Subgrade optimization - engineering measures
4.3 Roadside engineering protection measures

Retaining wall of snow

Snow fence

snow drift prevention forest

防风雪设施一览表

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The monitoring and early warning and emergency security system

Traffic information collection system
Traffic information publishing system
Bao tong of emergency rescue system

The monitoring and early warning and emergency security system
5 Engineering effect observation

Through the field survey analysis, on the basis of disaster formation mechanism and damage degree, highway wiring should make the most of favorable terrain, have played an important role in reducing the snow disaster.

Route optimization
K119 + 500 – K122 + 700 section
5 Engineering effect observation

Route optimization + Bridges - tunnel engineering

K79 + 305 - K80 + 270 section of the wind and the direction Angle of about 65 °, bridge design to avoid the tunnel excavation and the leeward deposits, exports to Bridges, effectively resolve the problems the wind snow flow backward.
5 Engineering effect observation

Subgrade optimization - separated subgrade, slow slope, cancel the guardrail

This project K83 + 600 ~ K135 + 679 section of the separated subgrade, its highly basic control above 2.5 m, slow slope at the same time, try not to set the guardrail, fence high embankment sections set cable. The end of February 2013 on-site observation of subgrade pavement snow after optimization in the following figure.
5 Engineering effect observation

Subgrade optimization - Open the subgrade cross-section

S201 line K68 + 178 - K68 + 178 road in the west wind, happen every year more than 10 times road blocking events caused by the snow deposition, become S201 line "their" sections. At the end of 2012 the open section of the highway subgrade treatment, forming LuDiShi cutting. Snow, reduces the cutting open the roadbed protection S201 line unimpeded, the winter of 2012-2013 after six months did not appear snow resistance phenomenon.
5 Engineering effect observation

Roadside engineering protection measures
- snow fence

S201 line K32 + 500 section of snow fence (3 way, every 130 m long, 3.5 m high, spacing of 40 m) snow effect is obvious. Investigation and see, all kinds of snow fence is filled with snow, maximum snow depth of 4.0 m, a preliminary estimate, the resistance of snow snow about 40,000 m3, reduced the K32 pass road of snow.
Karamay - Tacheng highway setting K117 + 400 section of a block of the skis (4 m high, 100 m long), winter, on both sides of the skis especially leeward filled with snow, the biggest stack height of 4.5 m, length of plate after stacking, about 60 m, preliminary estimates, the resistance of snow snow about 6000 m³, effectively alleviate the damage snowed-in roads, and improve the wind blowing snow visibility of the road.
Wind blowing snow S201 line in 2012 caused low visibility serious section of implementation of the 3.6 km line of sight inducing sign, indicating roadbed edge position when wind blowing snow, effect is obvious. The extension project of 2013 by embedding the analysis of the cantilever inducing sign the line of sight, and implement the solar view induction.
Project on the basis of the old tuyere-based, the wind range, on the edge of the wind belt line, the wind belt 8 automatic meteorological offices and stations in the wild, the center line of the layout and form a monitoring network, the implementation will be weather and road conditions to the comprehensive processing platform, after processing, warning information, and start the emergency rescue system.
5 Engineering effect observation

(1) Route in mountainous areas, when the hills terrain across the snow is very serious to choose in a relatively open terrain.

(2) In the wind and snow to harm, severe area, highway and highway subgrade cross-section appropriate USES separate sections. Monolithic roadbed should be appropriately raise the height, usually should not be less than 2.5 meters;

(3) The route to the dominant wind direction and the vertical cutting or 45-90 ° intersection, dealing with in slope method should be taken. Conditional can use tunnel or Ming hole through;

(4) In order to ensure the safety of winter road traffic should use cantilever inducing sign, indicating the road profile, prevention and control of the vehicle out of roadbed. Visibility is extremely low road to using solar energy light induced spontaneous standard;

(5) Storm harm serious road, automatic meteorological stations should be built up to carry out mid-term and long-term programs for highway snow damage research, establishing and perfecting the highway disaster monitoring network, building monitoring and early warning and emergency security system.
Warm congratulations on
The security and disaster relief coordination workshop
A complete successful!

Thank You

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