NOVATEUR PUBLICATIONS
INTERNATIONAL JOURNAL OF INNOVATIONS IN ENGINEERING RESEARCH AND TECHNOLOGY [IJIERT]
ISSN: 2394-3696 Website: ijiert.org
VOLUME 7, ISSUE 11, Nov.-2020

WATER-HEAT ORDER DEVELOPMENT DYNAMICS OF SALINED GROUND ROAD

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ABSTRACT
This article considers the heat and humidity change laws during the year at the highways foot and the water-heat regime processes in it. The heat and humidity order at the road foot was studied, and the research results on the specific heat capacity of the soil, the freezing depth depends on its salinity, elevation, salt amount and quality**.**

KEYWORDS: Lightly soluble salts, water-heat regime, temperature regime, saline soil, heat capacity, thermal conductivity, heat resistance, frost resistance, heat flux, eater.

INTRODUCTION
A large number of Uzbekistan's irrigated area is saline, including 77% in Fergana region, 70% in Bukhara region, about 70-80% in Khorezm region and the Republic of Karakalpakstan, 50-60% in Kashkadarya and Surkhandarya regions, and from 10 to 37% of the remaining areas in other regions are saline soils.

The lightly soluble salts content in soils varies widely. According to M.A. Pankov [1], the soils in Syrdarya region contain from 0.2 to 7% of slightly soluble salts and up to 60% of gypsum. According to L.F. Stupakova [2, 3], the salts content in the soils of Bukhara region reaches 9%, in some horizons - 13.3% and gypsum - 40%. In Khorezm region and the Republic of Karakalpakstan there are slightly soluble salts in soils from 2 to 15%.

The above-mentioned lightly soluble salts have different properties, the latter of which rapidly change their physical and mechanical properties depending on the quantity and quality in the soil. In order to correctly assess the soils salinity, as well as the water-heat regime, it is necessary to take into account a key natural factors complex affecting salt metabolism, namely the precipitation amount, climatic regime and others.

Natural and climatic conditions have a significant impact on the water-heat regime development of the road, because by definition it reflects the road temperature and humidity law during the year and the water-thermal processes that take place in it [4, 5].

Temperature regime is the temperature lawful change over time at different points along the path. It is the ambient air temperature function and its change law. Its humidity is inextricably linked with the pavement and pavement material temperature regime, which also changes legally throughout the year. For example, evaporation decreases as the air temperature decreases, resulting in excessive the saline soil salinization at the road foot. This leads to a decrease in the pavement strength and the road use quality.

The saline soil temperature is more stable than the air temperature, and this stagnation increases with increasing depth. With the cold days onset, i.e. the negative temperature in the soil cools more slowly than in the air, the soil depth freezing does not correspond to the entry 0^oC temperature into it. This is due to the salt solution presence in the water in the soil porosity. Therefore, the soils depth freezing will be less than the zero temperature entry depth.

The main important thermal-physical properties in the soils freezing are: heat capacity, thermal conductivity and thermal stability.

Heat capacity is the heat energy release in the accumulation or soils heat exchange.

According to the thermodynamics first law, heat in the soil is spent on work that is related to the change in internal energy and the soil expansion. The heat release into the soil is called its temperature change.

Volumetric and specific heat capacities differ.

The volumetric heat capacity is numerically equal to the heat amount required to change the ground volume per unit volume by 1°C, and it is defined by the following expression:

$$C_W=\rho_d \cdot C_d,\ (J/m^3 \cdot K), \qquad (1)$$

Where ρ_d is the density of the dry soil, kg/m^3; C_d is the specific heat capacity of the soil, J/kg·K.
The specific soil heat capacity is numerically equal to the heat number required to change its mass temperature per unit weight by 1°C [4].

$$C_Э = C_S + \frac{W}{100} \cdot C_W, \qquad (2)$$

$$C_M = C_S + \frac{W_{МЗ}}{100} \cdot C_W - \frac{W - W_{МЗ}}{100} \cdot C_Л, \qquad (3)$$

Where $C_Э$, C_M are the specific heat capacity of the soil in the thawed and frozen state, J/kg•K; C_S is the specific heat capacity of a saline soil particle, which is equal to:
Sandy loam - C_S = 741 J/kg·K;
Loam - C_S = 784 … 821 J/kg·K;
Gil - C_S = 868 … 915 J/kg·K;
C_W, $C_л$ is specific heat capacity of water and ice (depends on temperature); W is humidity,%; $W_{М3}$ is average amount of unfrozen water during freezing,%.
Thermal conductivity is the soils ability to transfer heat from a heated section to a cold section. It is balanced by the thermal conductivity coefficient, which is equal to the heat amount that is normal to the heat flow direction per unit time when the soil the cross section is 1 m^2.
Thermal stability is the soil ability to retain its strength and deformation properties as the ambient temperature increases.
Frost resistance is the ability to resist the negative temperatures effects. It is assessed by the change in the soil strength after a certain freezing and thawing cycle.
Snow cover can significantly affect the depth of soil freezing, reaching 10-50 cm for saline soils of the Republic of Uzbekistan.
One of the factors influencing the saline soil pavement strength and stability is atmospheric precipitation on the pavement surface. It is used for flow, infiltration and evaporation into the soil. The water probability and intensity penetration into the soil is determined by water permeability.
Heat flow: from top to bottom in summer, from bottom to top in autumn, from bottom to top in winter, from top to bottom in spring.
Changes in the water-heat regime at the saline soil bottom continue throughout the year. In this case, five periods can be distinguished:
1. Precipitation is the saturation of the roadbed soil with autumn moisture as a result of reduced evaporation of surface water (atmospheric precipitation). During this period, the soil moisture is equal to $W_{autumn} \leq (70 \div 75\%) W_{white}$, where W_{white} is the permeability limit of the soil.
2. Winter precipitation - occurs as a result of freezing of the soil. in the freezing of the soil, the moisture deposited during the accumulation period is redistributed. Moisture redistribution occurs due to the crystallization force and the presence of a temperature gradient at the base of the path. At this time, the moisture content of the roadbed soil increases and is approximately equal to $W_{winter}=(75 \div 80\%) W_{white}$.
3. In the third round, moisture freezes, which is not only due to weather conditions, but also due to the presence of snow on the roadside and side slopes. During this period, the moisture of the roadbed soil is in equilibrium.
4. Saturation period - the moisture content of the pavement soil increases rapidly due to the incoming moisture from the pavement surface (rainwater), as well as the moisture dissolved at the top and bottom. Melting rate for Uzbekistan is 3 cm/day. Ground moisture is $W \geq 80 W_{white}$.

5. Summer water-heat regime recovery period. Studies show that the intensity of wet precipitation of saline soils depends on the initial salinity level, especially for low-salinity soils, which occurs in 3 days, almost stops after 12-18 days. In the first 3 days, the increase in soil moisture reaches 60-70% compared to the initial.

The saturation of the saline soil with moisture will pass it off as soon as the initial moisture content is low. The study made it possible to determine the maximum distance from the source of moisture, depending on the type of soil, based on the ability of the source of moisture to migrate moisture during exposure. This distance is less saline when the exposure time of the humidification source is 20 days: 2.5-3.5 m for clayey soils, 3.0-4.0 m for loamy soils, 7.0-9.0 m for sandy loam soils and 27.0-36.0 m for fine sands.

Another important factor in designing saline soil roads is the freezing depth of the soils. Freezing of soils has a great impact on the distribution and movement of moisture, changes in the phase composition of the soil, the height of the lift, and so on. Studies have shown that soil freezing is significantly influenced by soil type, amount and quality of salt, its humidity, intensity and duration of exposure to negative temperatures, thermal conductivity of soil, thickness of snow cover and other factors.

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