STRAIGHTENING THE LEANS OF A LARGE-PANEL HOUSE
OF SERIES 1-480-P AFTER SETTLEMENT OF THE FOUNDATION*

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In connection with the fact that the standard plans recommended for the construction of large-panel houses
(series 1-480-P and 1-464-P) on slumping soils called for the large consumption of steel, the Research Institute of
Foundation Beds (NII Osnovanii) together with the Southern Research Institute of Industrial Construction (YuZhNII)
tested, to reduce the cost of construction, an experimental large-panel, three-section house of series 1-480-P (the
author of the Giprograzhdanpromstroi project) which was built on slumping soil in block No. 100-101 in Zaporozhe
with artificial inundation of the foundation soil.

As a result of deep inundation of the foundation soil, the sections of the building settled unevenly and leaned
(see table). It follows from the table that the extreme sections I and especially III, lean appreciably in the longitudinal
direction of the house, exceeding the permissible leans for normal building service by a factor of 1.5-3.

However, despite such an appreciable difference in settlement of individual sections, no deformations in the
structural element were detected. Differential settlement led to a 480-mm gapping of the settlement joints between
the I and II sections within the cornice and 860-mm between the II and III sections. In the lower part of the base,
gapping of the settlement joints in connection with horizontal displacement of the extreme sections to the side of in-
undation was respectively 150 and 230 mm (Fig. 1).

*A description of the design of the house, soil conditions, and test results were published in our journal No. 2, 1961.

Fig. 1. General view of the house after settlement.
To restore the serviceability of the house, on the suggestion of NII Osnovanii it was decided to straighten the leans of the house by inundation performed according to a specially worked out plan with partial loading to completely eliminate the leans.

The leans were straightened out by the former Zaporozh'e branch of YuzhNII, the former YuzhNII, and by the Zaporozhchistroi Trust under the supervision of NII Osnovani.

The possibility of straightening out the leans of the structure, which in plan occupy an appreciable area, was determined by:

1) the spatial rigidity of the individual sections of the house;

2) by the presence of a soil layer compacted by heavy rammers within the deformed zone of the foundation bed;

3) by the appreciable thickness of the slumping soils in the foundation;

4) by the virtual uniformity of the soils with respect to slumping properties;

5) by the appreciable rate of occurrence of settlement deformations.

Straightening of the house involved:

a) determination of the physomechanical properties of the soil from borehole specimens;

b) construction of drainage wells 500 mm in diameter and 7 m deep along both long walls of the house arranged longitudinally at a distance of 7.2-8.4 m from the ends of the extreme sections and transversely at a distance of 0.8-1.9 m from the walls of the building (Fig. 2);

c) the construction of a network of temporary waterlines with their connection to all the drainage wells;

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d) layout of a geodetic control to determine vertical displacements of the house and surrounding area.

Depth and base markers installed when testing the house were used to measure the layered deformation of the soil and vertical settlements of the foundations.

The following works were performed while straightening the house:

a) inundation of the foundation with systematic measurements of the daily consumption of water by water meters;

b) measurements of the settlement and leans of the building sections during inundation;

c) measurements of the settlement of the surface of the earth in the area abutting the house and observation of the development of settling cracks in the soil mass;

d) determination of the moisture content of the soils of the settling stratum during inundation;

e) observation of the layered deformation of the settling stratum;

f) visual observation of the deformations of the building structures.

Inundation of the foundation of the house began on August 10, 1962 with delivery of water into the wells between axes 9-12 in order to reduce primarily the appreciable lean of section III. Flooding through wells situated within section II began on August 17, and on both sides of section I on August 22. The delivery of water to the wells was stopped on October 13, 1962; its total consumption was 6920 m³.

The rate of delivery, break periods, and total consumption of water was regulated for each well during the entire period of inundation with consideration of the actual increase of the magnitudes of vertical displacements and leans of the sections.