INLAND WATERWAY OF VARISTAIPALE

CONSTRUCTION HISTORY


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- The water route between lake Juojärvi and Varisvesi consists of Taivallahti canal with two locks and Varistaipale canal with four locks.
- The level difference between lake Juojärvi and lake Varislampi (small lake between Taivallahti and Varistaipale) is 6,4 m. Accordingly, the height difference between Varislampi and Varisvesi is 14,6 m.
  - Total height difference between lake Juojärvi and lake Varisvesi is 21 m
  - Sailing distance between Taivallahti locks and Varistaipale locks is 2,9 km

Pre-construction phases

First request to build waterway connection between lake Juojärvi and Varisvesi was done by Colonel HJ Granfelt in 1876. This proposal was based on a route option from south-east corner of lake Juojärvi to lake Orivesi in the municipality of Liperi. Length of this option would have been 9,3 verst, a bit more than 10 km. Due to the height difference between the lakes, 24,9 m, this option would have required to construct 10 locks.

- Preliminary cost estimation for this option was about FIM 1,3 mio, equal with € 5,3 mio. This option was not approved by the authority in charge (Tie- ja Vesikulkulaitosten Ylihallitus) and The Imperial Senate decided not to finance this option.

- Eleven years later, in 1887, the second request for constructing the waterway connection from lake Juojärvi to the water route from Kuopio to Savonlinna was made by the Province Governor of Kuopio district. This request was also not supported by the authority in charge and the request was rejected.
- The third request was presented to the Parliament in 1904, 28 years after the first request. Representatives of Kuopio and Liperi circuits, Mr. Juho Snellman and Mr. A. J. Horttanainen handed over an application to Peasantry in Parliament to start urgent construction of a waterway connection from the municipality of Kaavi via the lakes Rikkavesi and Juojärvi to the sailing route from Kuopio to Savonlinna.
    - The Imperial Senate accepted the request and assigned FIM 15.000 (about € 70.000) in 1906 budget for soil investigation and preparation works.
        - ❑ First route option from 1876, from south-east corner of Lake Juojärvi to Lake Orivesi in the municipality of Liperi, had already been rejected.
        - ❑ Second route option, Juojärvi - Petrumajärvi – Kermajärvi. Due to challenging ground conditions, this option would have been FIM 1 million more expensive than other remaining options
        - ❑ Third route option was from Juojärvi to Varisvesi via Varislampi to the sailing route Kuopio – Savonlinna. This option was evaluated to be the cheapest one of these three options
    - The authority in charge, ”Tie- ja Vesirakennuksen ylihallitus” proposed to The Imperial Senate of Finland, that the route option Juojärvi → Varislampi→ Varisvesi should be chosen. The project would be financed by the Government. Budgeted cost was FIM 1.39 million.

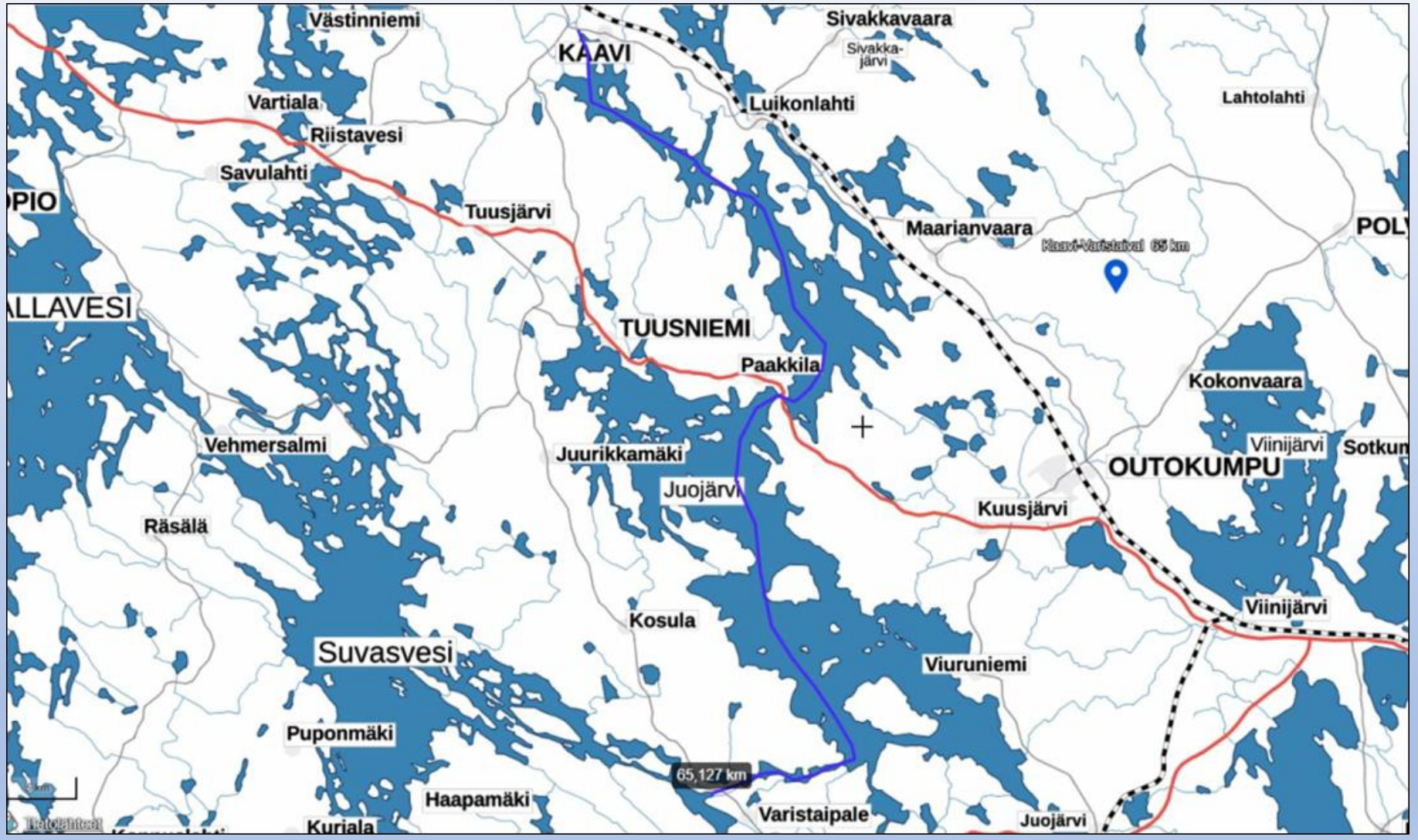
Route options:

1. Juojärvi--> Orivesi
2. Juojärvi--> Petrumajärvi-->Kermajärvi
3. Juojärvi--> Varislampi-->Varislahti

- The Imperial Senate of Finland appointed a special comission to establish that the proposed canal really would be necessary and economically cost-effective. The Imperial Highness approved the application 26.10.1910.
- Appropriated allowance, FIM 1,39 mio. was subject to the actual flexibility of financial resources of the State.
- Due to a poor employment situation and lack of foodstuff, the living circumstances in the municipalities of Heinävesi, Kuusjärvi and Tuusniemi were critical. Therefore, the municipalities applied the works to be commenced immediately as relief works. The authority in charge ”Tie- ja Vesirakennusten Ylihallitus” favoured the proposal and the Imperial Senate authorised 5.5.1911 to start the works immediately. The works were commenced in the first half of June 1911.

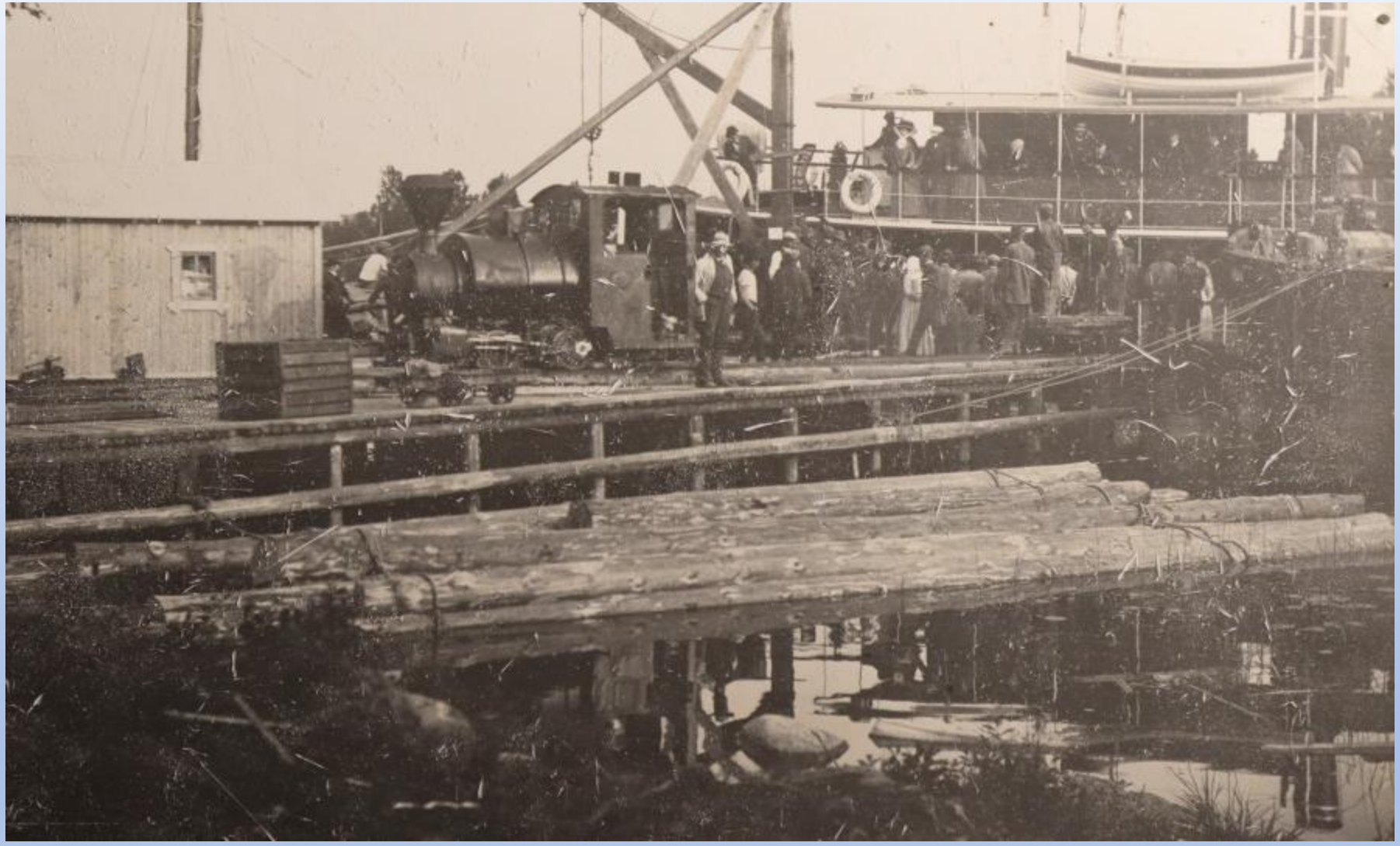
PROGRESS OF THE WORKS

- According to the favourable desicion, 5.5.1911, of the Senate, the works were commenced as relief works right away in June. At this stage, the confirmed advance payment by the Senate was only FIM 100.000.
- The technical design complied with earlier constructed Suvasvesi→Kermajärvi→Joutsenvesi canal's design.
  - Low water depth in locks 2,1 m
  - Minimum width of locks 7,6 m
  - Practical length of locks 31,6 m
  - Total length of locks from gate to gate 36,8 m
- After completion of the locks and canal works the Kaavi → Ohtaansalmi → Juojärvi sailing route will be connected to the earlier constructed Kuopio → Suvasvesi → Kermajärvi → Joutsenvesi sailing route. The length of the sailing route Kaavi → Varistaival → Varisvesi will be around 65 km.


Västinniemi
KAAVI
Sivakkavaara
Sivakka-
järvi
Vartiala
Luikonlahti
Lahtolahti
Riistavesi
Savulahti
Tuusjärvi
Maarianvaara
Kaavi-Varistaipale 65 km
TUUSNIEMI
Paakkila
Kokonvaara
Vehmersalmi
Juurikkamäki
Viinijärvi
OUTOKUMPU
Juojärvi
Kuusjärvi
Räsälä
Kosula
Viinijärvi
Suvasvesi
Viuruniemi
Puponmäki
65,127 km
Haapamäki
Varistaipale
Juojärvi
Kuriala

- The main machinery was mobilised from Vääksy channel contract which was completed prior to the Varistaipale contract's commencement.
- Due to the poor road connection to Varistaipale, the only option to transport materials for the lock construction was through Kuopio-Heinävesi-Savonlinna water road by barges during ice free period. To enable discharging of goods from barges to the construction site, a solid re-loading quay was constructed in Varislahti, downstream the Varistaipale channel. Wintertime material transport was possible on ice.
- The re-loading quay was equipped with 5 tons derric crane. A narrow-gauge track (60 cm) was built between the re-loading quay and the canal construction site. A five-ton steam locomotive took care of the transports from re-loading quay to the construction site.
- Electric power supply was not available in Varistaipale village during the construction period . Due to this, a steam operated 220 V DC generator was employed at the site to enable the operation of drainage pumps and other electrically operated tools.

Re-loading quay in Varislahti



- The canal construction works were commenced in 1911
  - A brook from Varislampi and Varisjärvi to Varislahti was temporarily routed beside new canal line.
  - Overburden on rock at the new canal line was removed.
  - The canal section downstream of the locks was built as dry works inside diverting dams.
  - The construction of accommodation and office facilities for civil servants operating the canal was commenced.

CANAL ROUTE ON LAND AND SIDE EMBANKMENTS

Excavation inside diverting dams

Excavation inside diverting dams

Excavation inside diverting dams at winter time

BUILDING OF LOCKS

- Both Varistaipale and Taivallahti locks were constructed at rock basement. The quality of rock at these locations was very fragmented slate gneiss, and not suitable for wall- or doorstone construction of lock gates.
- Suitable rock material for lock walls and doorstones was blasted at a distance of 40 km from the site in Leppävirta, a neighbour municipality to Heinävesi, at an island of lake Suvasvesi. The stones were transported to the site by barges.
- The delivery and installation contract of wall- and doorstone materials was awarded to Oskar Flink, contractor from city of Kuopio.

Rock blasting and excavation of locks

Rock blasting and excavation of locks

Blasted and excavated lock basement

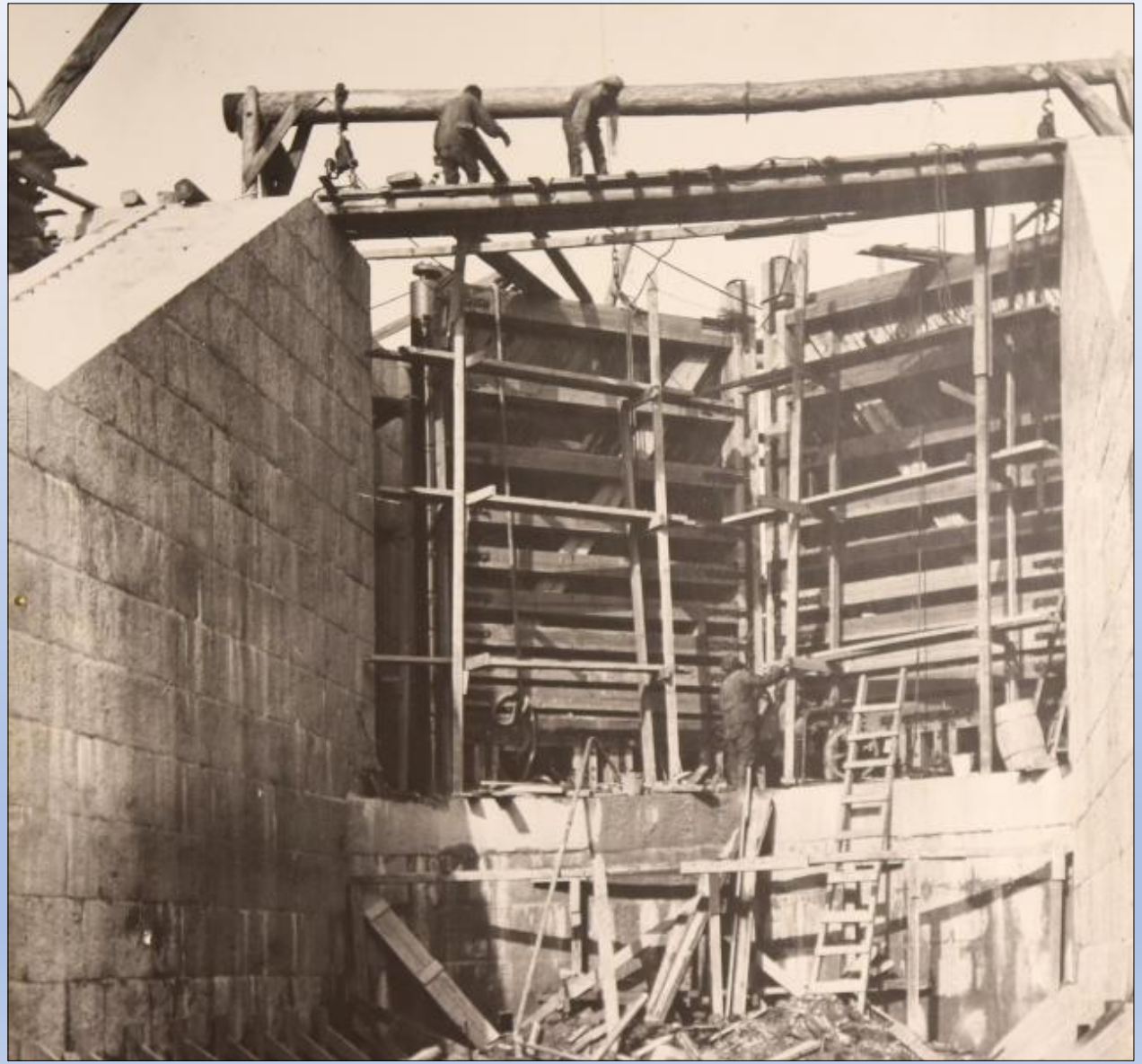
Loading wall- and doorstones from barges to the site

Building doorstones for locks

Building lock walls

Finished lock wall

Installation of lock gates



Testing of lock gates

Completion of Varistaipale locks

- By end of 1913 the section between Varisjärvi and Varislahti was completed.
  - A swing bridge of country road across the canal was installed
  - Diverting dams both up- and downstream were removed and the canal was filled by water
- Third of November 1913, first test-vessel was passing from Varislahti to Varisjärvi through four locks of Varistaipale canal
- All service- and administration buildings for the project were finalised
- By end of 1914 all lock walls and the fairway downstream of the locks were completed

Construction the canal between Varisjärvi and Taivallahti

- Early 1914 works at the open canal section between Varisjärvi – Varislampi – Taivalahti, upstream of the topmost upstream lock of Varistaipale, were commenced.
- The soil at this section was very soft, mainly sludge
- To enable the construction of a navigable fairway, balance embankments on both sides of the fairway were required.
- Soft soil, pushed aside into the fairway by balance embankments, was removed, and side slopes were protected by rock layer on top of gravel bed based on piled foundation.

Taivallahti-Kaavinkoski lake section

- Taivalahti locks, 2 nos. were completed in October 1914
- In the second half of 1914 the deepening of open canal section between Taivallahti and Juojärvi was done by a steam operated dipper dredger, mobilised from Vääksy canal construction site. In local dialect (savo) dredger got a nick name ”Mutrauskone”. The project management was swedisch speaking and in swedisch language a dredger is called mudderverk. In savo dialect ”Mutrauskone” was easier to pronounce than mudderverk. Single rock high spots were blasted by divers prior dredging. This open canal section was finished spring 1915.

DIPPER DREDGER ”MUTRAUSKONE”

- In June 1915 the ”mutrauskone” was moved to Kaavinkoski and the dredging there was completed in September same year.
- Last dredging area in the Kaavi-Taivallahti section was in Ohtaansalmi.
- Based on a final official checking from 15.to 18. August 1916 (bar sweeping), the shipping channel from Kaavi via Taivalahti and Varistaipale locks to Kuopio-Savonlinna shipping channel was found to be finished and approved for traffic.

- The project emplyed 600 men at peak and innumerable horses for earth moving and material transport.
- Based on records available from the project, no fatal accidents were recorded. When taking in consideration working conditions and working methods, this sounds like a miracle.
- Final project costs were as per budget, FIM 1.389.794.