SUMMARY: (U) NORTH KOREA PROBABLY DEVELOPED NUMERICAL MODELS USED TO DESIGN UNDERGROUND STRUCTURES WITH LARGE CROSS SECTIONS AND IMPROVED METHODS TO CONSTRUCT UNDERGROUND FACILITIES. ENCLOSURES

TEXT:
1. (U) THE DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA (DPRK) RESEARCHERS DEVELOPED NUMERICAL MODELS USED TO DESIGN UNDERGROUND STRUCTURES WITH A LARGE CROSS SECTION. ANOTHER RESEARCHER DEVELOPED A METHOD TO CONSTRUCT THE SIDE WALL OF UNDERGROUND FACILITIES WITH A LARGE CROSS SECTION. A PANORAMIC SKETCH OF THE P'YONGYANG METRO CONSTRUCTION DEMONSTRATED THESE TECHNIQUES.
2. (U) DESIGNING OF UNDERGROUND FACILITY

IN DECEMBER 2006 DPRK SOURCE PUBLISHED A RESEARCH PAPER ABOUT DESIGNING AN UNDERGROUND FACILITY.

- AUTHORS --
  - ((CHO'NG)) PYO'NG-HO, P'YONYANG RAILWAY COLLEGE
  - ((KIM)) CHONG-WO'N, CHO'NGJU RAILWAY VOCATIONAL TECHNICAL SCHOOL

- TITLE -- METHOD FOR EVALUATION OF ROCK MASS STABILITY WHEN DESIGNING UNDERGROUND FACILITY WITH LARGE CROSS SECTION


3. (U) METHOD TO CONSTRUCT SIDE WALL OF UNDERGROUND FACILITY

IN DECEMBER 2006 DPRK SOURCE PUBLISHED A RESEARCH PAPER ON DEVELOPMENT OF A METHOD TO CONSTRUCT THE SIDE WALL OF AN UNDERGROUND FACILITY.

- AUTHOR -- ((O)) SO'NG-CH'O'L, P'YONGYANG UNIVERSITY OF CONSTRUCTION AND BUILDING MATERIALS, P'YONGYANG

- TITLE -- METHOD TO CONSTRUCT REINFORCED CONCRETE SIDE WALL OF UNDERGROUND FACILITY WITH LARGE CROSS SECTION

- MATERIALS --
  - FORMS -- 2,000 MILLIMETERS (MM) LONG, 2,750 MM WIDE
  - ANCHOR BOLTS -- 1,200 MM LONG, 30 MM IN DIAMETER
  - REINFORCED CONCRETE -- VERTICAL REINFORCEMENTS, 16 MM IN DIAMETER, HORIZONTAL REINFORCEMENTS, 14 MM IN DIAMETER

- CONSTRUCTION PROCEDURES --
CONSTRUCTION LAYOUT (ENCLOSURE 1) SHOWS CONCRETE CAST BETWEEN THE ROCK MASS AND FORMS FIXED WITH ANCHOR BOLTS JUTTING HORIZONTALLY OUT FROM THE ROCK MASS.

- O SO'NG-CH'O'L MANUFACTURED A CRANE USED IN THE CONSTRUCTION. THE CRANE MOVED ON RAILS AND WAS EFFICIENT IN CONSTRUCTING A SIDE WALL OF 8 METERS (M) OR HIGHER. THE DATA OF THE CRANE ARE AS FOLLOWS.
  - ARM LENGTH -- 17.8 M
  - CRANE HEIGHT -- 2.6 M

4. (U) P'YONGYANG METRO (b)(7)(E)

A DPRK SOURCE PUBLISHED A PHOTO OF THE PANORAMIC SKETCH DISPLAYED AT P'YONGYANG METRO REVOLUTIONARY MUSEUM. THE SKETCH, ENTITLED "KIM IL SO'NG OBSERVING CONSTRUCTION OF UNDERGROUND PALACE," WAS PRODUCED IN 1980. THE PANORAMIC SKETCH (ENCLOSURE 2) SHOWS AN ARCHED UNDERGROUND FACILITY, A CROWN BEFORE LINING WAS CREATED, AND FORMS TO BUILD A TUNNEL WALL TO THE LEFT OF THE ARCHED FACILITY.
(b)(7)(E)

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