Chapter 0 Why Fluid Mechanics?

0.1 Speculation of Leonardo da Vinci

0.2 Physics of Golf

0.3 Water Resources

0.4 Dams

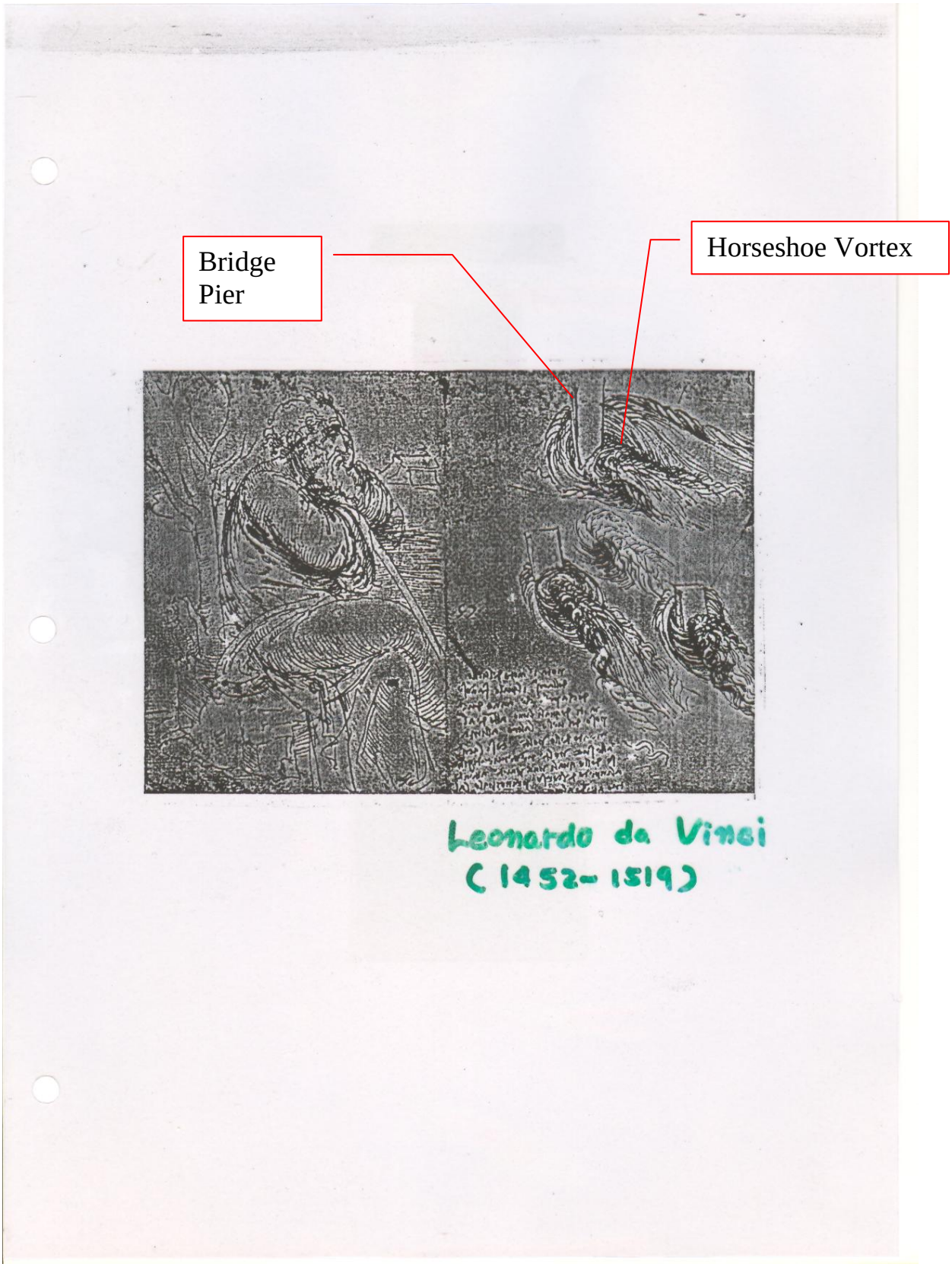
0.5 Hydropower Plants

0.6 Spillways

0.7 Flooding of the Han River in 1995

0.8 River Navigation

0.1 Speculation of Leonardo da Vinci



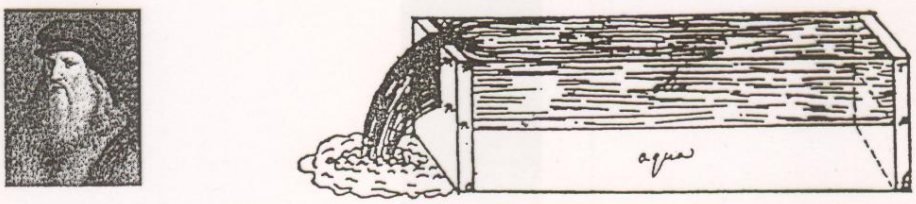
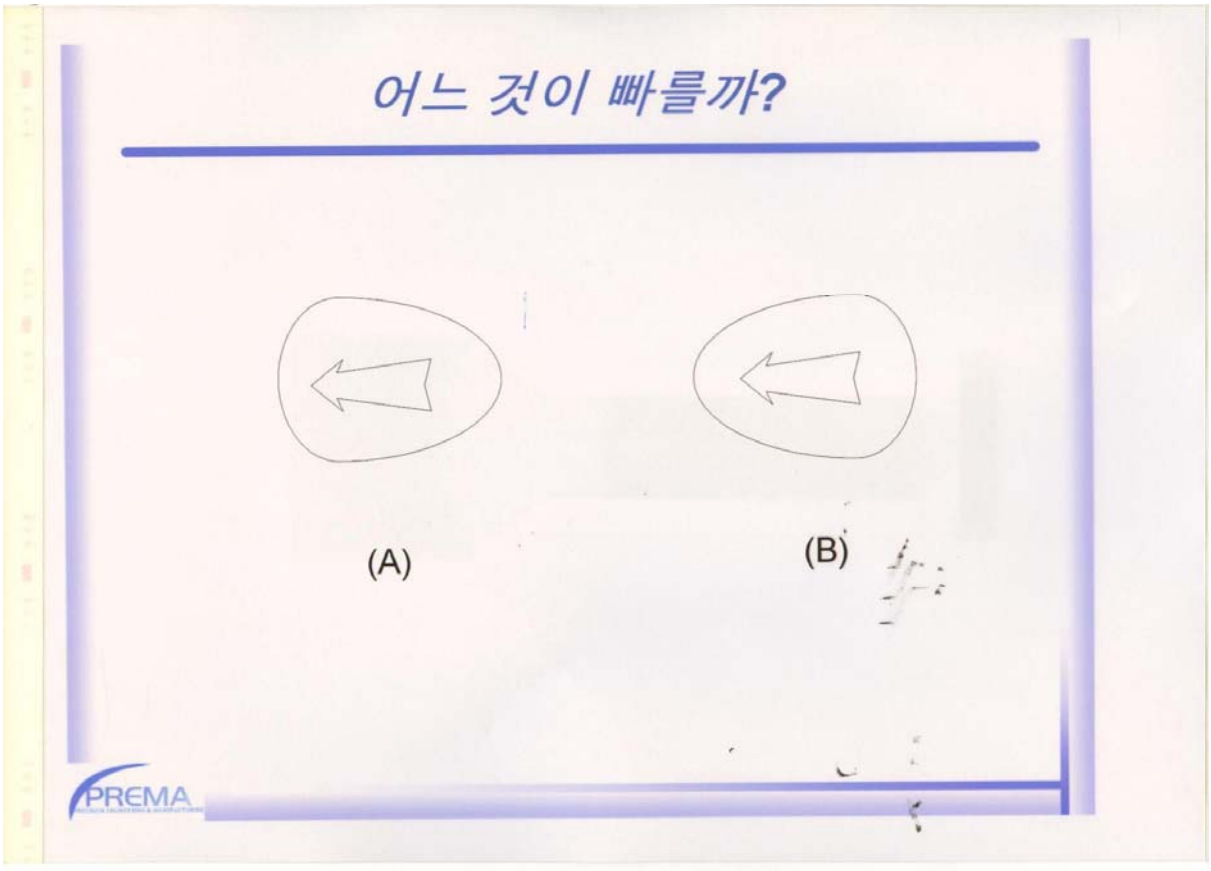
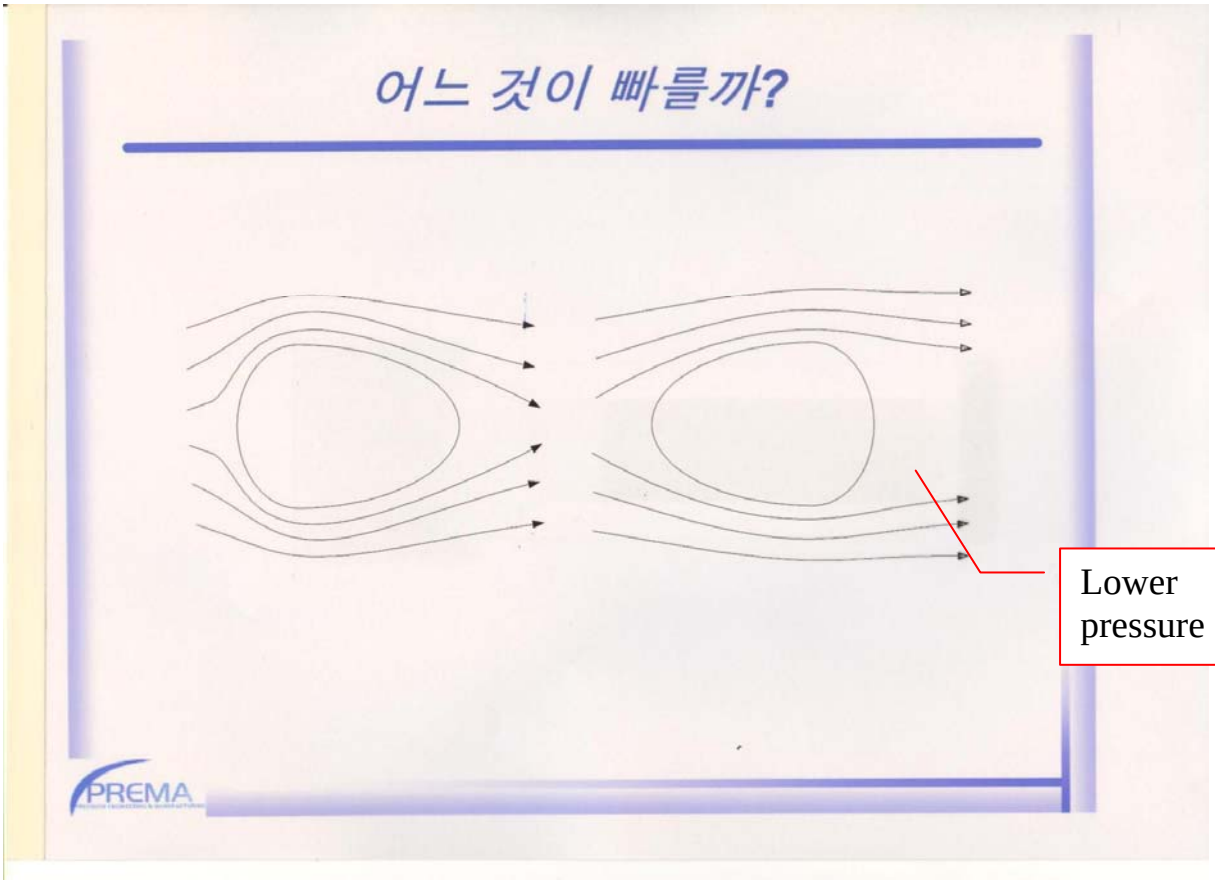


그림 1-1 Leonardo da Vinci와 그가 그린 위어에서의 물흐름

0.2 Physics of Golf




어느 것이 빠를까?
Lower pressure
PREMA

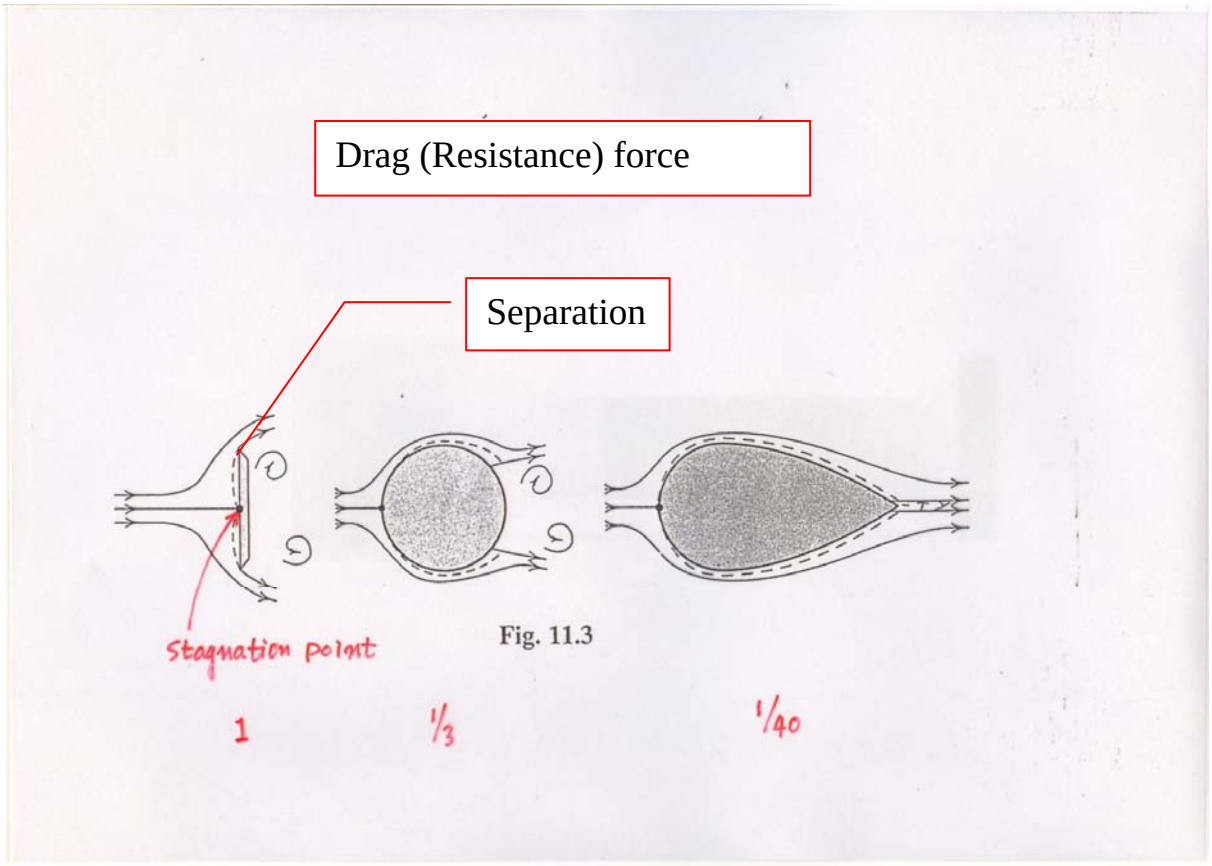
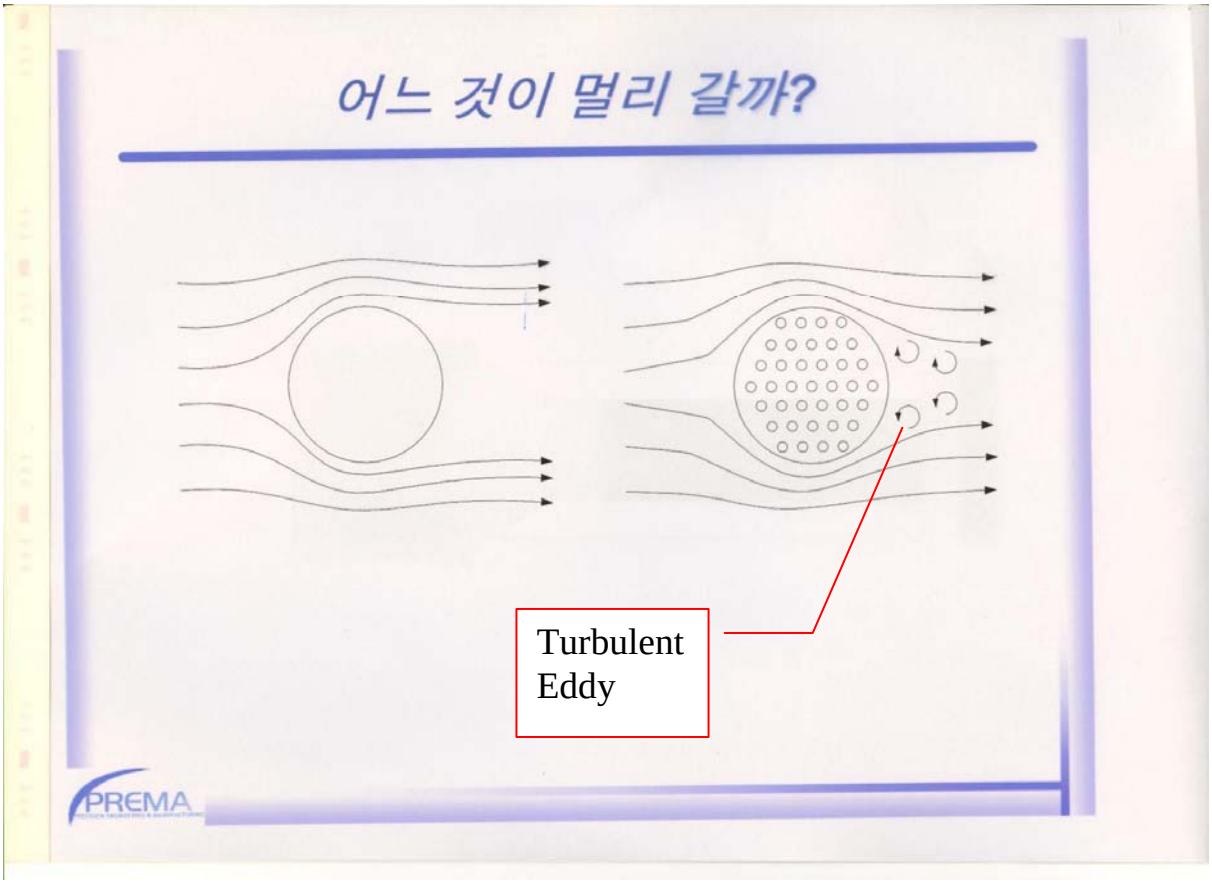

Drag (Resistance) force
Separation
Stagnation point
1
1/3
1/40

Fig. 11.3


어느 것이 빠를까?
LIMAR

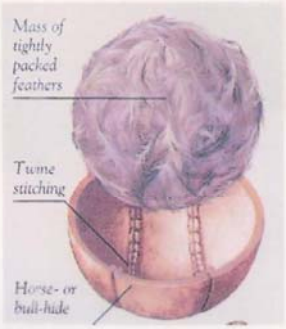


Scarred ball

Guttie ball

Dimple ball

Feathery Ball



Last feathery made by Robertson, in 1852

PREMA

Guttie Ball

Smooth ball made by Robertson in 1852

Red, hand-hammered guttie for use in snow

Hand-hammered Robertson guttie from the 1850s

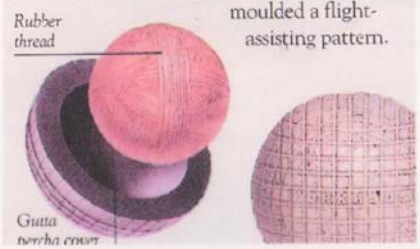
Guttie ball stamped with a distinctive circle marking

PREMA

Rubber-core Ball

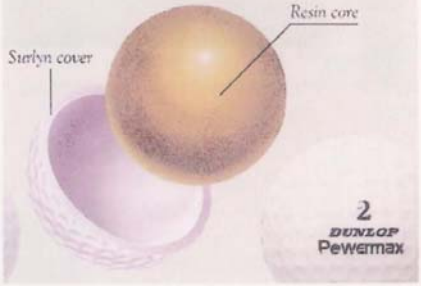
The Rubber-core Ball

The rubber-core ball, developed by Coburn Haskell in 1898 and first made commercially in 1901, could be hit farther and faster than previous designs. It was made by winding great lengths of rubber yarn, stretched under tension, around a rubber core. A livelier core enabled golfers to exercise more control over the ball's spin and flight. Early models had a gutta percha covering, on to which was moulded a flight-assisting pattern.



Two-piece

A high-energy acrylate or resin core with a tough cut-proof blended cover gives the two-piece more length than any other ball. It is also virtually indestructible which, with its top roll distance, makes it by far the most popular ball among ordinary golfers. However, because it has a lower spin rate, it is less easy to control.



PREMA

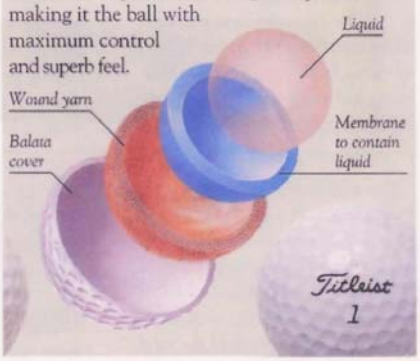
Rubber-core Ball

THREE-PIECE (SURLYN COVER)

This version of the three-piece wound ball has a solid rubber core over which rubber yarn is wound for good control. The cover is made from Surlyn, a thermoplastic resin that is harder than balata and is thus considerably more durable; it is virtually uncuttable.

THREE-PIECE (BALATA COVER)

The balata-covered, liquid-centred three-piece ball might be described as the most advanced of golf balls. The wound construction over a liquid centre, combined with a soft, synthetic balata cover, produces the highest spin rate, making it the ball with maximum control and superb feel.



PREMA

0.3 Water Resources

물 수요-공급 전망 (단위 : 억톤)

	2001	2011
물수요량	337.4	370.0
물공급량	338.0(100%)	351.6
- 하천수	158.8(47%)	164.8
- 댐	147.8(44%)	152.1
- 지하수	31.5(9%)	34.8
공급량-수요량	0.6	-18.4

Water Shortage

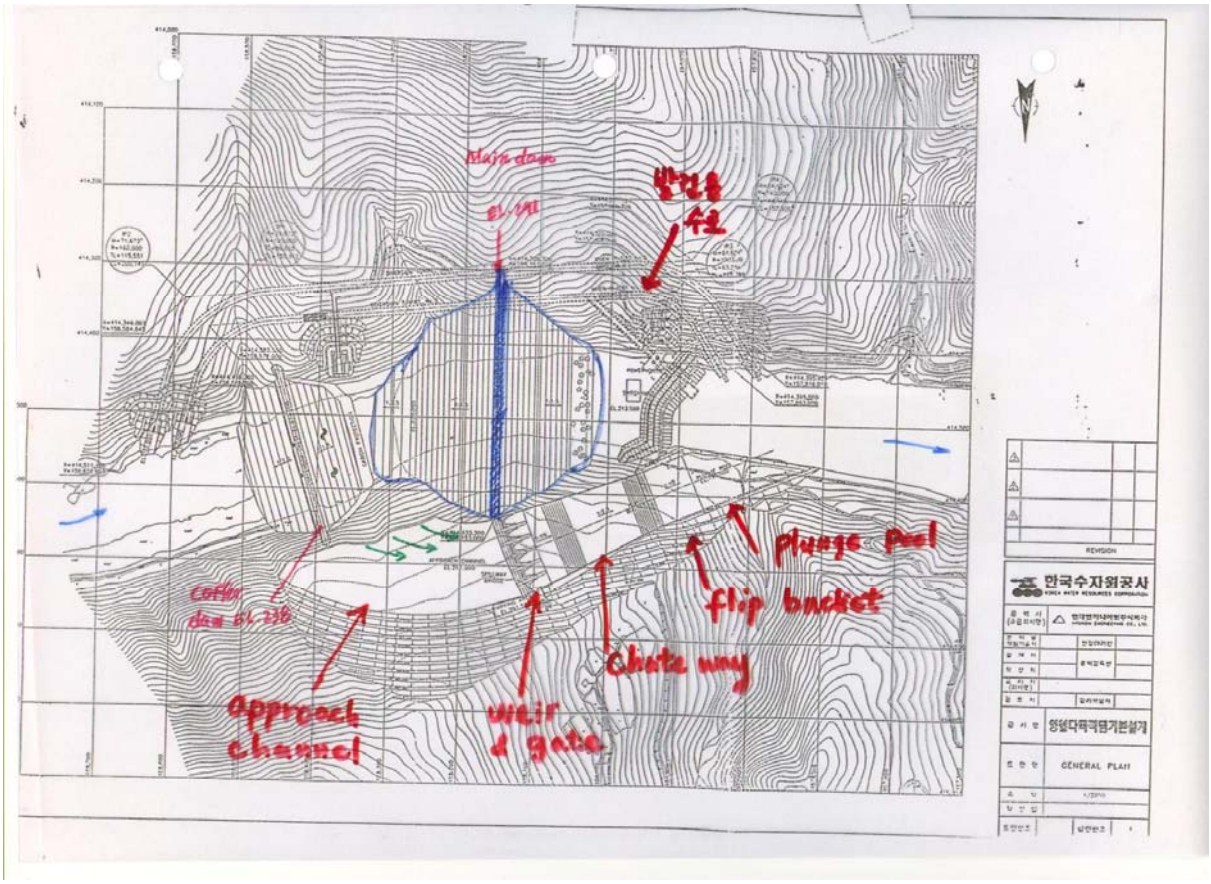
0.4 Dams

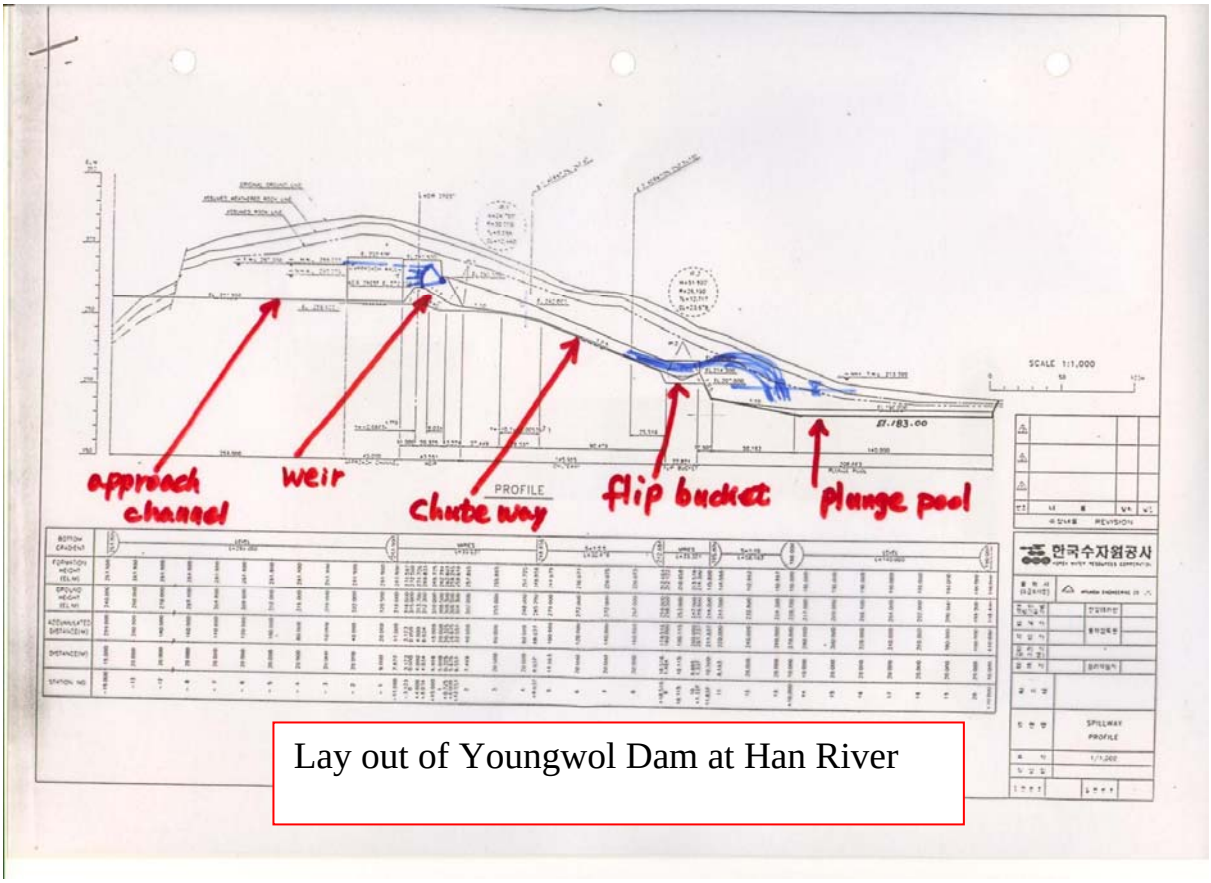
Chungju Multi-purpose Dam at Han River
(Concrete Gravity Dam)

Yongdam Dam at Guem River
(Rock Fill Dam)

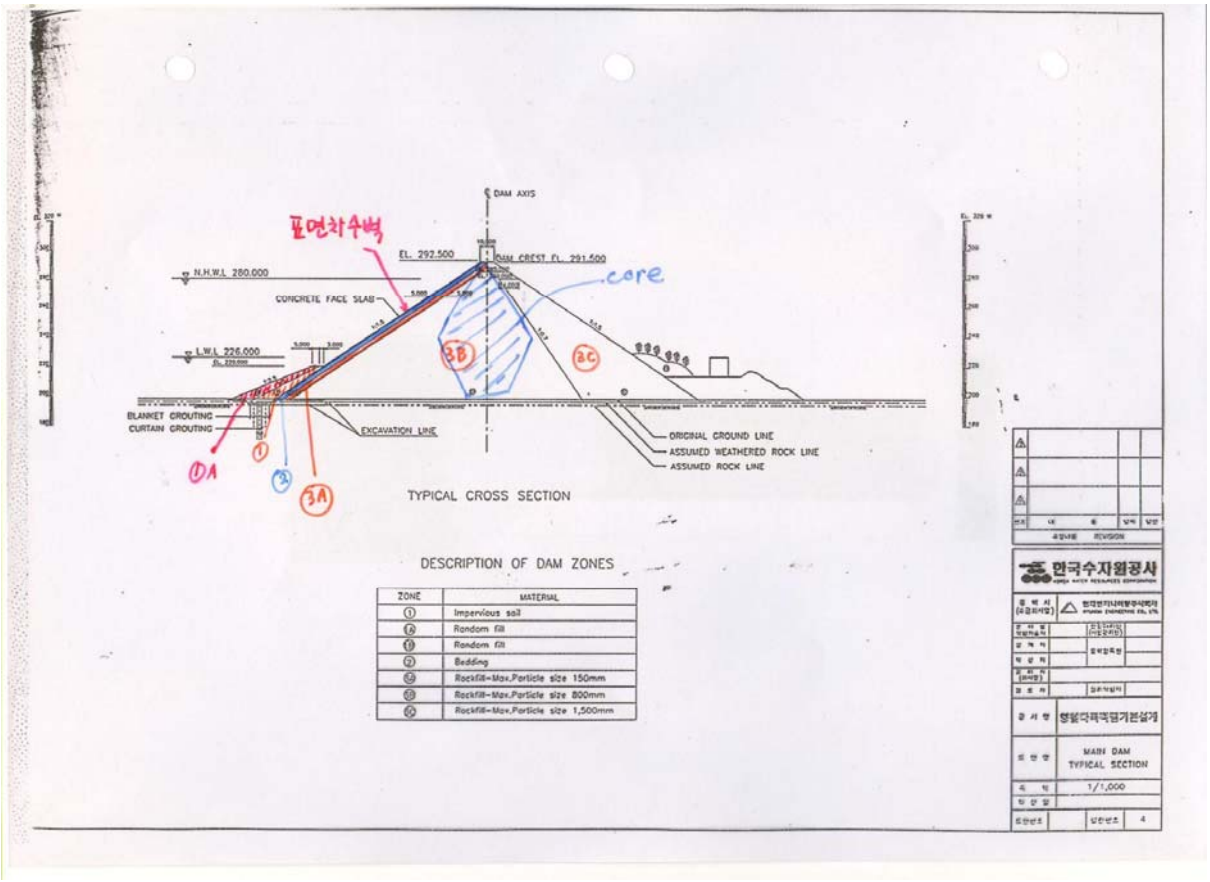
그림2.4 장성 농업용 댐(영산강) Changseong Irrigation Dam(Yeongsan R.)

Changseong Dam at Yeongsan River (Earth Fill Dam)

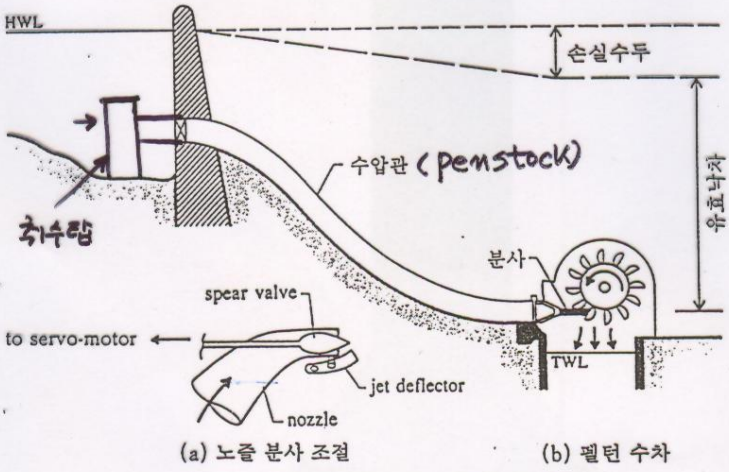




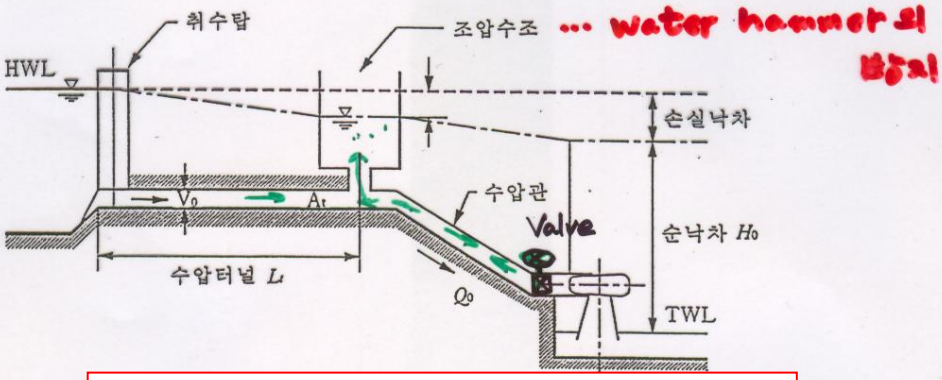
Lay out of Youngwol Dam at Han River


DAM AXIS
표면차수벽
EL. 292.500
DAM CREST EL. 291.500
core
N.H.W.L 280.000
CONCRETE FACE SLAB
L.W.L 226.000
3B
3C
BLANKET GROUTING
CURTAIN GROUTING
EXCAVATION LINE
ORIGINAL GROUND LINE
ASSUMED WEATHERED ROCK LINE
ASSUMED ROCK LINE
1A
1
2
3A
TYPICAL CROSS SECTION
DESCRIPTION OF DAM ZONES
ZONE
MATERIAL
① Impervious soil
1A Random fill
1B Random fill
② Bedding
3A Rockfill-Max.Particle size 150mm
3B Rockfill-Max.Particle size 800mm
3C Rockfill-Max.Particle size 1,500mm
한국수자원공사
MAIN DAM
TYPICAL SECTION
1/1,000

0.5 Hydropower Plants

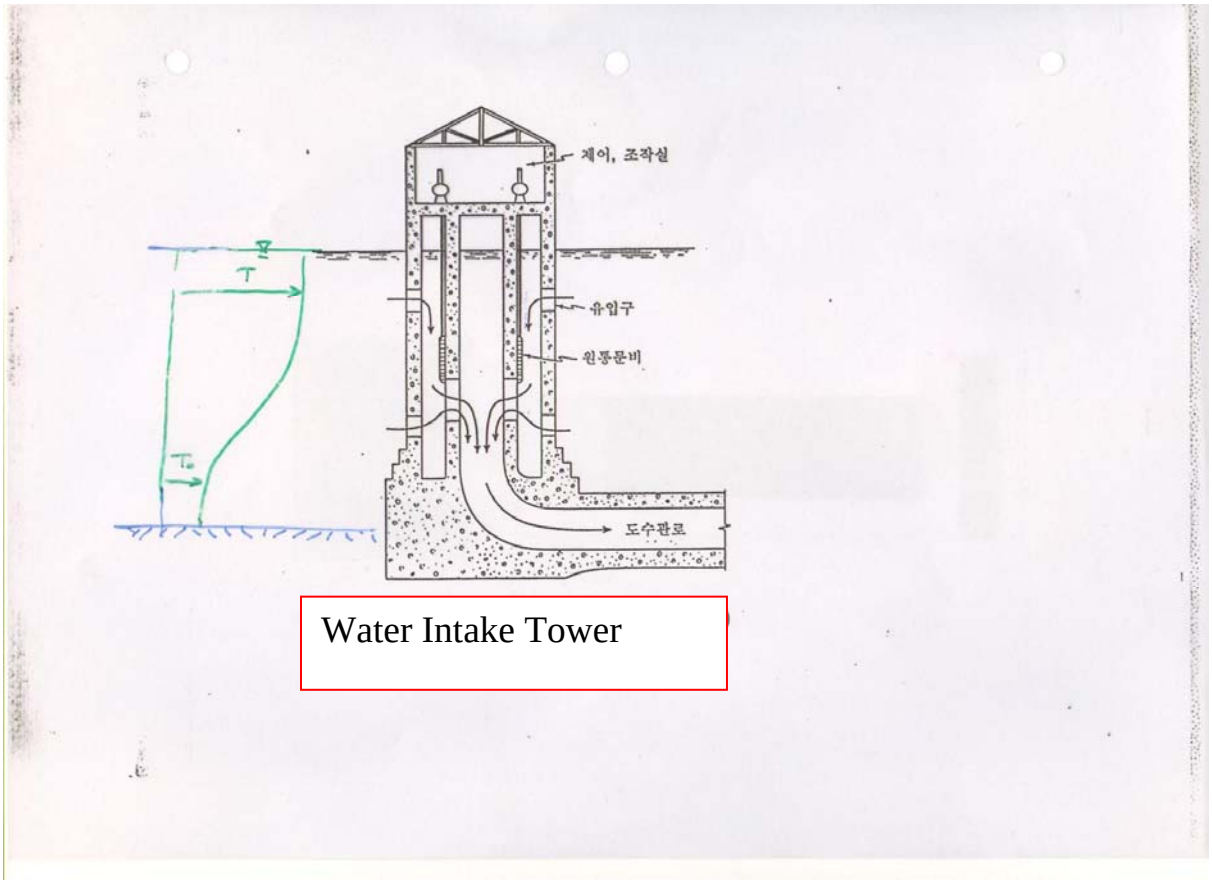


Penstock of Hydropower Plant



... water hammer의 방지

Surge Tank for prevention of Water Hammer



Water Intake Tower

0.6 Spillways

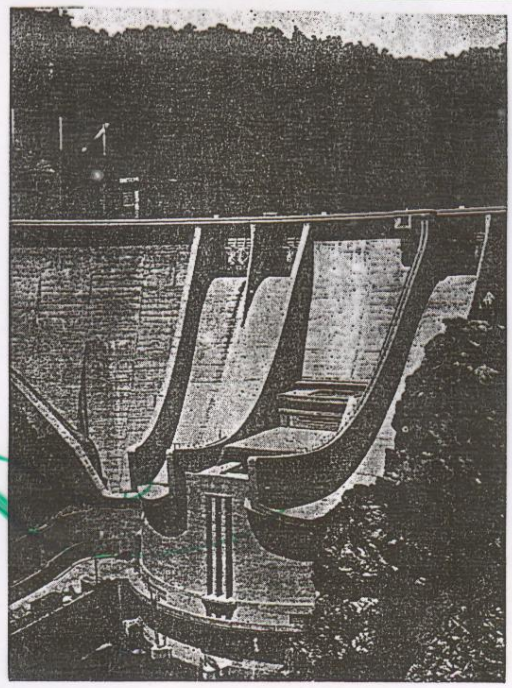


그림 8. 17 스키점프 여수로(프랑스 l'Aigle 댐)

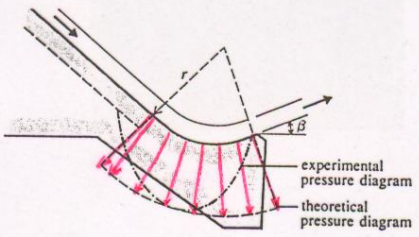
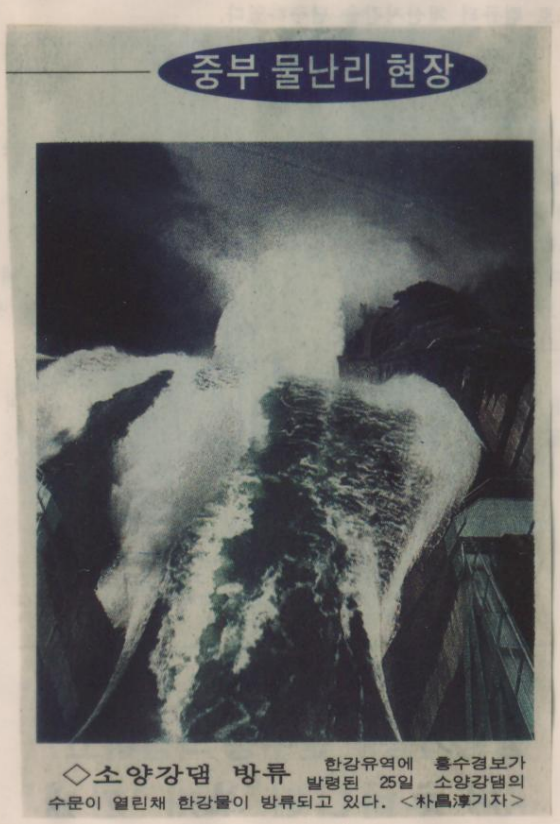


그림 8. 18 버킷부의 설계

0.7 Flooding of the Han River in 1995



1995 Han River Flood

◇황토물「大路」 63빌딩에서 바라본 올림픽대로. 25일 오후 한강 물이 크게 불어나면서 노량진 일대 올림픽대로가 황토물에 잠겨버렸다. <李起元기자>

1995 Han River Flood

0.8 River Navigation

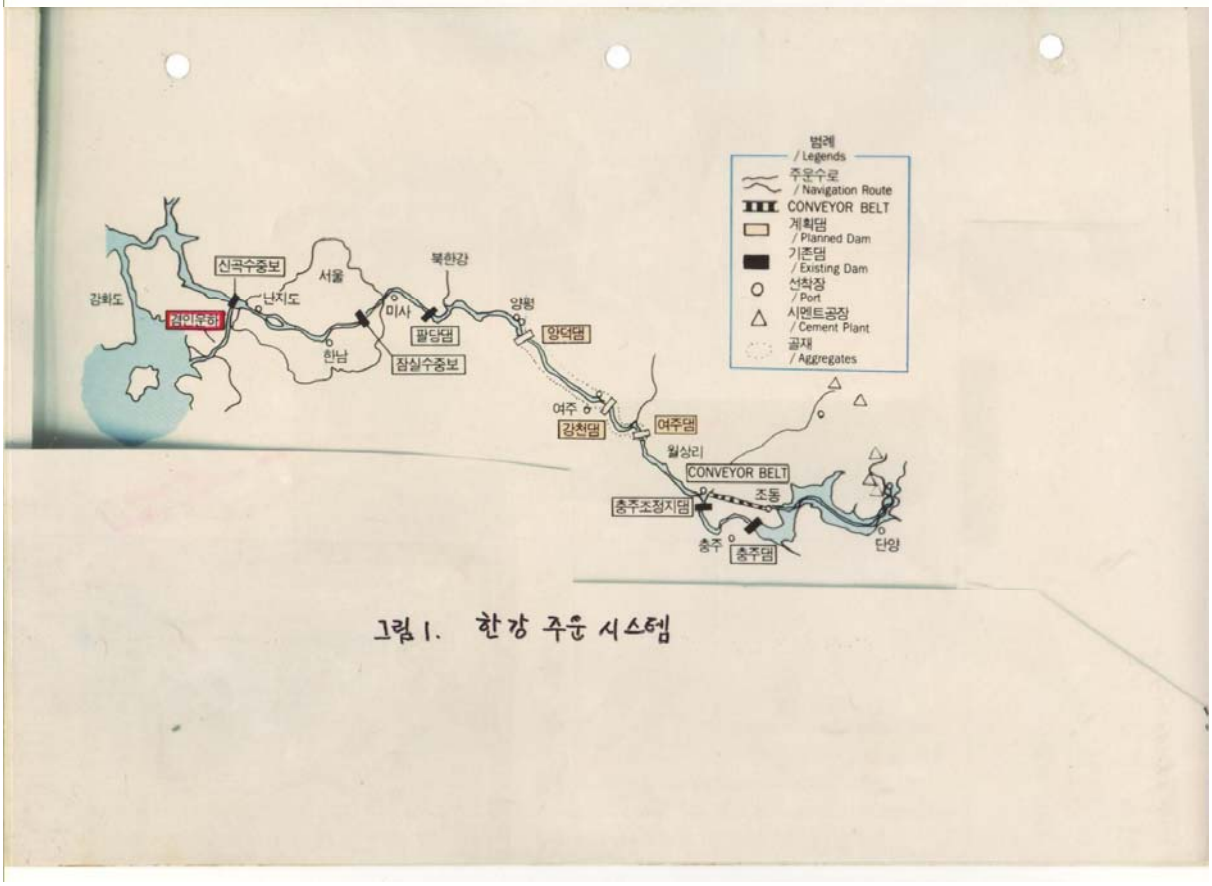
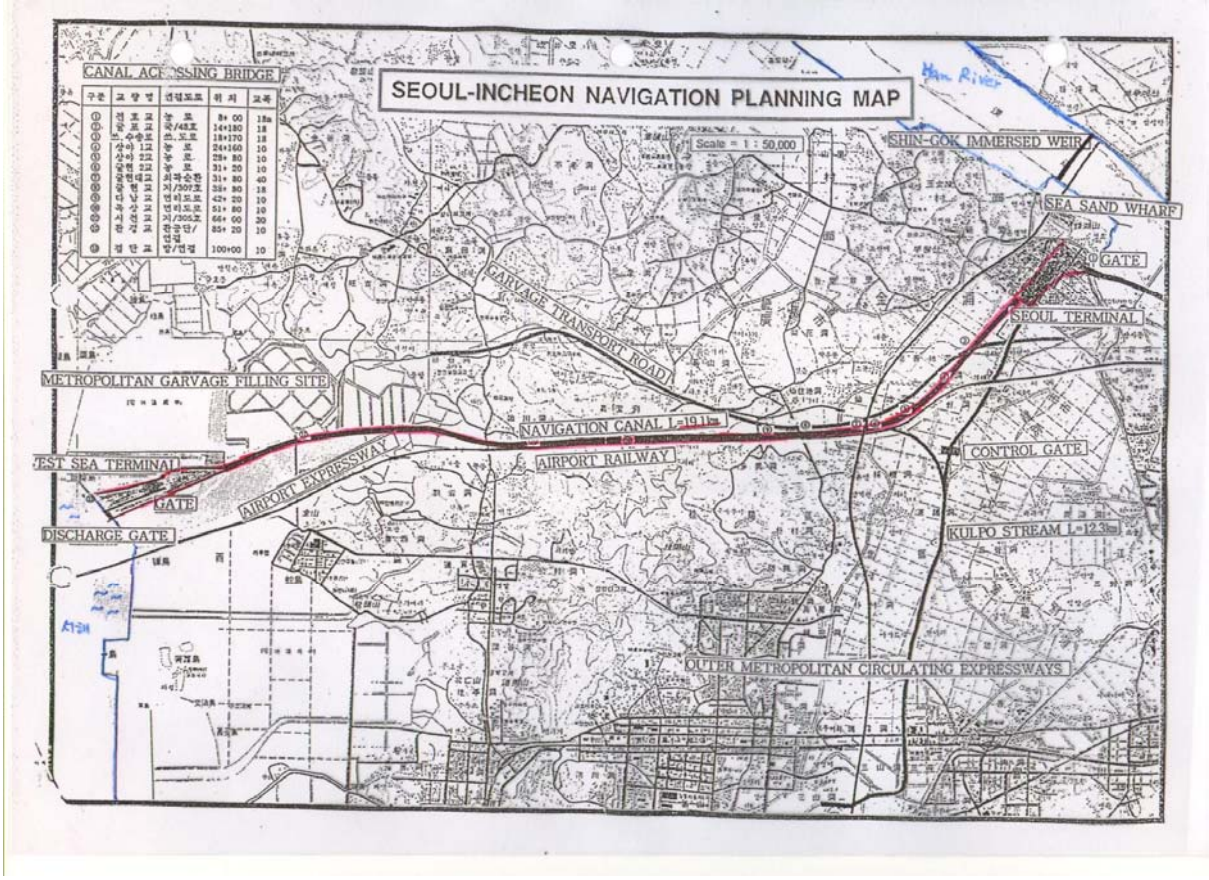

범례
/ Legends
주운수로
/ Navigation Route
CONVEYOR BELT
계획댐
/ Planned Dam
기존댐
/ Existing Dam
선착장
/ Port
시멘트공장
/ Cement Plant
골재
/ Aggregates
신곡수중보
서울
북한강
강화도
난지도
미사
양평
팔당댐
양덕댐
한남
잠실수중보
여주
강천댐
여주댐
월상리
CONVEYOR BELT
조동
충주조정지댐
충주
충주댐
단양

그림 1. 한강 주운 시스템


SEOUL-INCHEON NAVIGATION PLANNING MAP
Scale = 1 : 50,000
Han River
SHIN-GOK IMMERSED WEIR
SEA SAND WHARF
GATE
SEOUL TERMINAL
GARVAGE TRANSPORT ROAD
METROPOLITAN GARVAGE FILLING SITE
NAVIGATION CANAL L=19.1㎞
AIRPORT EXPRESSWAY
AIRPORT RAILWAY
CONTROL GATE
WEST SEA TERMINAL
GATE
DISCHARGE GATE
KULPO STREAM L=12.3㎞
OUTER METROPOLITAN CIRCULATING EXPRESSWAYS