CE 331 1/10/15
Environmental Engineering 3credit

Water Books :- Water Supply Engineering by M.A Aziz

Introduction to Env Eng

Water ~~supply~~ safety plant - ITN

2nd Class 15/9/15

objective of water supply system

(I) { - Safe water must be supplied
- From aesthetic point of view water should be clear

(II) { adequate quantity

(III) easily available to consumers

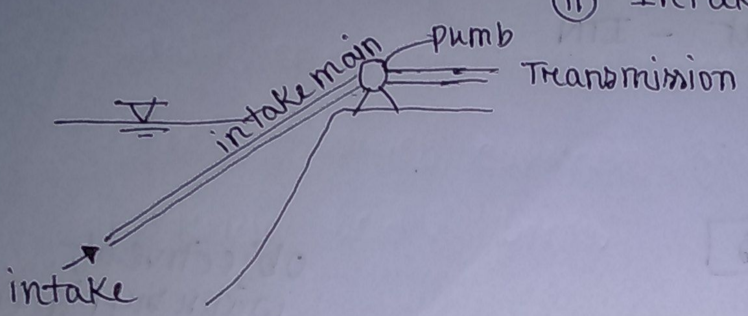
- Elements of Water supply system
- Source of water (I) Ground water
(II) Surface water

* চাকায় বুড়িগঙ্গা, তিস্তা পানির ।

Selection of Source

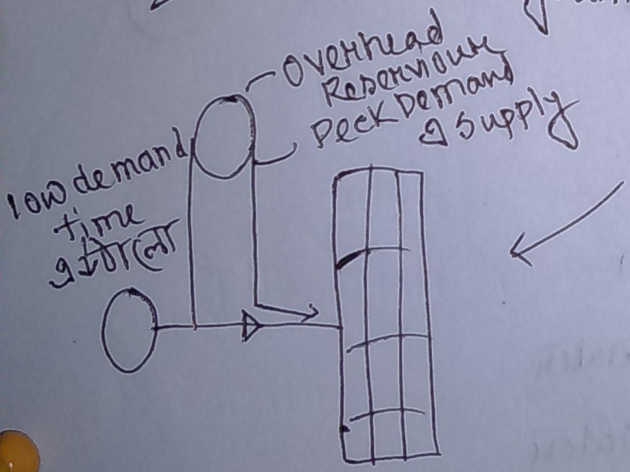
(i) quantity – Main consideration
(ii) quality – যেটি quality good সেটি, must be ensured
(iii) Cost – collection, distribution, treatment

▷ collection system
(i) Intake
(ii) Intake Main
(iv) pump
(v) Transmission main



▷ Treatment ~~Method~~ unit

▷ Distribution system
(i) gravity system
(ii) Direct Pumping
(iii) Pumping with stroge reservior



সুবিধা (i) পানির crisis হবেনা
(ii) Loss & Waste হয় না
} ideal case

Overhead Reservior – costly –

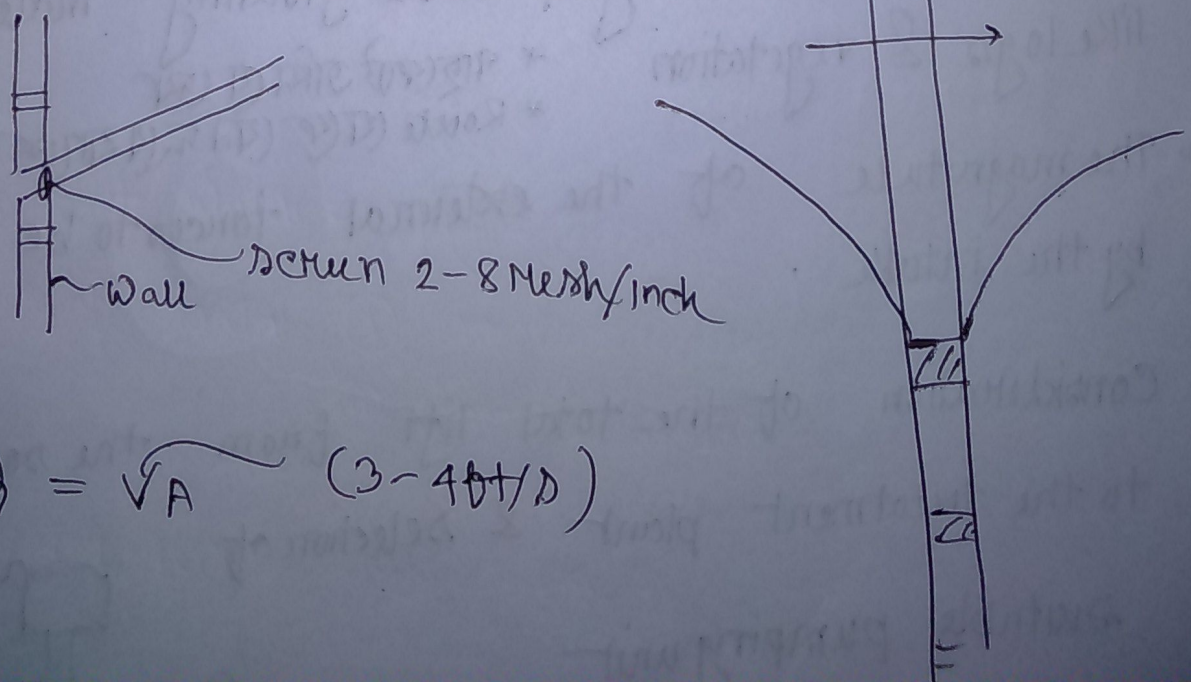
Intake velocity & Depth

- intake entrance should lie 10 to 15 ft below the water surface.
- Entrance velocity 3 to 4 inch
- Grating or screen of 2 to 8 mesh to an inch are provided at intake entrance

Intake pipe are design at v 4ft per second.

* chapter 4 Aziz Surface water coll & Transmission

Fig 4.1
4.2



$$Q = \sqrt{A} \quad (3-4 ft/s)$$

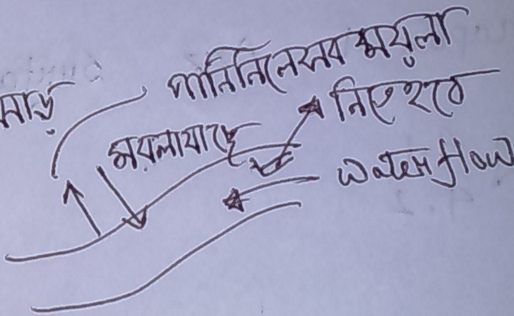
Factors Must be considered

(I) Location of Best quality of Water

(II) Possibility of wide function of water level.

(III) Characteristics of intake surrounding i.e depth of water, character of the river bottom, navigation, effects of waves, currents, floods & scouring the river bed & banks

▷ Formation of shoals & bars



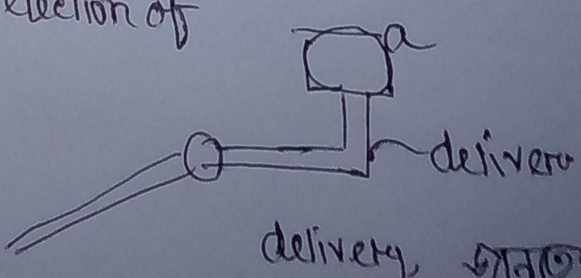
▷ Possible source of pollution

▷ Provision of excluding possible floating materials like logs & vegetation

* গাছ কেটে ভাসিয়ে দেয়
* Route থেকে যেন দূরে থাকে

▷ The magnitude of the external forces to be resisted by the intake.

▷ Consideration of the total lift from the source to the treatment plant & selection of suitable pumping unit



delivery, জানতে হবে

- Determination of total length of suction & delivery mains, head loss
- Suitable screen
- hole 2-3 diff level
- cost benefit Ratio (VVI in civil Eng)
- Assurance of the safety of intake source
- Provision for ~~future~~ extension & installation of standared
- Provision for future extension & installation of standard unit

6/10/15 DelWar Sir

- চার ধরনের Pipe
- Gravity pipe/ Pressure pipe
- pipe selection smoothness of pipe
- pressure Pipe কেন use করা হয়।
  High Density polyethelinepipe
- Metallic Pipe দিলে Corrosion হয়।
  i) _ electric passing হয়
  ii) Particle influence করে
  iii) Acidity and alkanity
  CO_2 ⟶
  Alkanity ↑ —— Corrosion কমে
  Homogenoisity change হলেই Corrosion কমে
  iii) Sulphur content ↑ — Corrosion ↑
  iv) Biological Activity | Aerobine জীবাণু
  v) Velocity of flow — কমে গেলে Erosion হয়।
  vi) Change of Temp ↑ বাড়বে
  vii) Cavitation - Tap থেকে মাঝে মাঝে আসে/না
  - ৫
  Cavitation

- মাঝে মাঝে pressure
  " " suction

Cavition হলে Erosion হবে,
মাঝে মাঝে Water থাকে/না

Reduction

(i) Homogenous Pipe
- Different material হলে Corrosion বেশী

(ii) Paint - Bitaminus দিয়ে Paint
Sometimes Galvarising.

Effect of Corrosion

(i) Pipe তাড়াতাড়ি Damage
Corrosion, Rusting হলে পানির মধ্যে চলে আসে,
তাড়াতাড়ি Damage হলে অনেক ক্ষতি

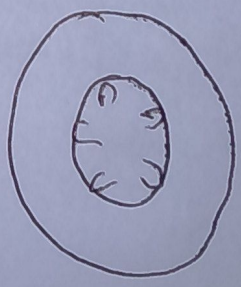
6/10/15 1

বাকী Habibur Rahman Sir এ পরে।

Scaling. অনেক সময় স্তর পড়ে যায়
- Water এ Hardness বেশী হলে
- Probability হলে soft করে pass করাতে হবে।

Forces Acting on pipes:

1) internal Forces



$$\sigma_h = \frac{PD}{2t}$$

$$\sigma_L = \frac{PD}{4t}$$

Dia ↑ Thickness D↑ | 4" < হলে $1/2$" down
1" < " $1/4$" down

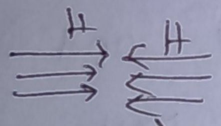
(i)

(ii) Internal Forces due to water Hammer

(iii) Forces at Bends and changes X section

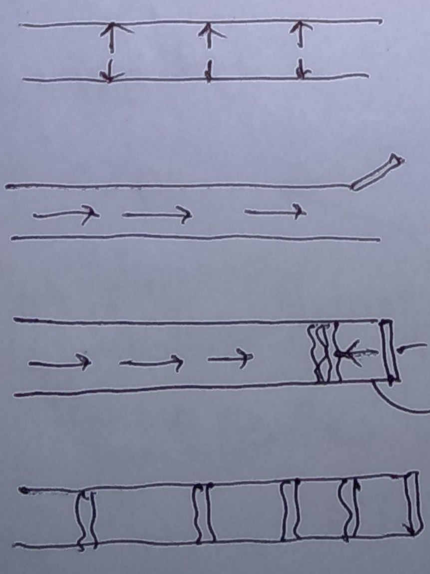
(4) F " due to Temp change

(5) External forces in form of backfill, traffic and weights.



Face করে বিপুল F create করতে পারে
– Pipe ভেঙে যেতে পারে.

Water Hammer
⇓



off করালে
clash – Severe Bandage

Building কাঁপে
sound severe

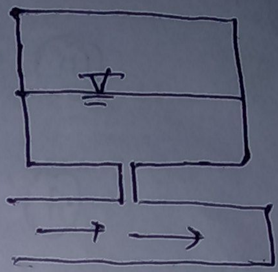
→ Bulb Quick বন্ধ করা হয়েছে – clash

Remove

1) Bulb should be ~~chossed~~ slowed

But always not possible

if we keep ~~Water~~ Air chamber upstream of bulb then pipe will safe



Suddly Water flow বন্ধ করলে দুই দিকের Flow হওয়ায় clash.

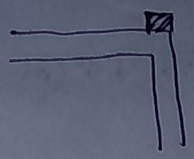
Phase 1 :– The valve on the line is closed and water contained in the line is at rest. Water P is this exerted

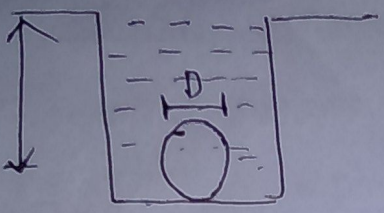
" 2

" 3

" 4

③ বড় Pipe থেকে ছোট Pipe হলে Thrust পড়বে,
- Support না দিলে Force
- Moment
- huge problm





- পাইপ রাস্তার পাশে
- গাড়ি গেলে Pressure হবে
- বড় P সাপেক্ষে Calculate
- ৩৫% 2.5 রাখতে হবে

4.1 4.2

Backfill এর জন্য ব্যয়

Transwidth 1 / দেড় width বেশী রাখাহয়

D + 1/1.5 "

নাকবলে - Rigid Pipe এর জন্য বেশী Load লাগবে,

- Mild steel, Load অনেক কমে যাবে

$P = C\gamma B^2$

$= C\gamma BD$

$B = D + 18''$ (Normally করাহয়)

Transwidth < 18" একসূত্র

" > 18" অন্য

— Flexible pipe এর জন্য কম
— U.D.L ... বেশী হবে
— xm এ দেয়া থাকলে value দেয়া থাকবে

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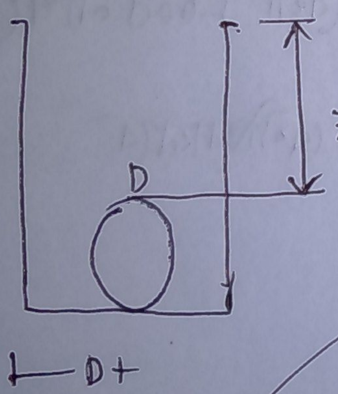
pipe joints — 8টি

1) imperviousness
ii) elasticity
iii) strength
iv) durability
v) Adhesive

3) Excavation of trench
4) preparation of the bottom of trench excavated
5) Lowering of pipes
6) Laying of pipes
7) jointing Pipes
8) Anchoring of pipes
9) Back filling or refilling



Pipe Testing (10)

pressure variation হলে উপরে উঠতে concrete দিয়ে Anchorage

75 psi তে Test করতে seepage

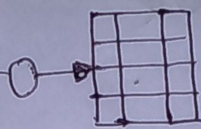
Chapter 4

Chapter- 1 Location of intake

Fill in the gaps + short Question

Water Distribution System :-

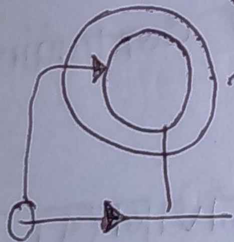
i) Gravity System :- → source উপরে। History
suitable source থাকলে No Need i) pump
ii) Electricity

ii) Direct pumping :-  → পানি নাই Pump নাই

 বিভিন্ন H এ বিভিন্ন Pipe

Problem i) বেশী Demand তখন পাবে না
ii) যখন দরকার নাই তখন Waste

iii) Pumping with storage Reservoir.



(i) তারপরও → প্রতিনা ez overhead Reservoir costly
(ii) → উপরে উঠানোও Costly

Overcome :- i) Roof tank
ii) gt ~~bucket এর মাধ্যমে~~
underground Reservoir

Method of Water

Aziz chapter 9
জনস্বাস্থ্য প্রকৌশল

Method of Water Supply :-

i) Continous Method – Always Water
ii) Intermidiate " – মাঝে মাঝে Water

Always better ✗

Continous

i) Water চাই সবসময়। তাই

Intermidiate Meth

i) অতিরিক্ত Storage লাগবেই,
" বাড়তি
" Cost

ii) ~~ii)~~ Contamination এর
Chance বেশী
বাড়তি Contamination হতে পারে

ii) শুধায় পানি আসবে। Tap খোলা
রেখে চলে আসলাম
Direct Loss of Water

iii) ~~iii)~~ পানি আসলেই instant
Water ফেলে দিচ্ছি.
Direct Wastage

iii) Fire problem হলে – Serious damage

iv) পানি নাথাকলে। Vacum – Suction
Contaminate Water