S13.3-26 ミニ・ワークショップ（第 3 回 JCC のテーマおよび無収水削減の戦略実施計画に係る発表）

PROJECT PROGRESS: 15 pilot projects and DMAs, AND Issues and Challenges.

3rd JCC Meeting
Date: 19 March 2015
Venue: Solomon Water Conference Room

Contents

- Achievements of the Projects in the 15 pilot areas.
- DMA Progress
- Issues Encountered when Implementing the Non Revenue Water Measures.

Achievement of Project Purpose - 15 Pilot Areas

- **Overall Goal:** SW's Service level are improved and SWs Revenue is Increase.
- **Project Purpose**: SW is assisted to achieve its target of reducing the NRW ratio in Honiara to 30% by 2015
  - **Indicator 1**: The NRW ratio is reduced by 30 points in each pilot project area, selected DMAs and/or LCZs
  - **Indicator 2** : Regarding the pilot project areas, selected DMAs, and/or LCZs where the NRW ratio before the implementation of NRW reduction measures are less than 30%, the NRW reduction measures are implemented in accordance with features of each area and/or zone, so that effectiveness of the NRW reduction measures are validated.

- All Pilot Areas achieved NRW reduction point of **30 points**.
- Lengakiki and Tuvaruhu 1 went through additional countermeasure to achieve 30 points reduction.
- Mbaranamba Case: NRW ratio before countermeasure was already less then 30 points.
- NRW reduction measure was implemented to satisfied indicator 2.

Output 1 – Planning process of SW for NRW Reduction is Systemized

- Indicator 1-1: Annual Budget for NRW is secured in the pilot project areas and LCZs.
  - Total Cost incurred by NRW in the 15 Pilot Areas is **SBD2.23 Million**.
    - Equate to SBD 148,800 per pilot area, or
    - SBD 152,500 per 100 household
    - SBD 100,400 per km of pipe (total pipe length of pilot area approx. 22km)
  - If converted to whole Honiara City (total pipe length approx. 178km), the total estimated cost is **SBD 17.87 M** in today's value.

- **Indicator 1-2: The strategic Implementation (rolling-out) plan for NRW reduction of approved by management of SW**
- Based on the result of the 15 pilot project, the preparation of rolling-out plan has commenced.

Increase in Revenue Water Volume as a result of NRW Reduction Activities in 15 Pilot Areas

- Total Revenue Water **before** NRW Reduction Activities is **1420.6 m3/day**
- Total Revenue Water **after** NRW Reduction Activities has increased to **2,845.4 m3/day**
- Daily increase of Revenue Water as a result of the Project is **1,424.8 m3/day**
- **Converting to Monetary Value**
  - Honiara's unit water supply price (not tariff price) is SBD 16.89/m3
  - The total annual revenue by the NRW Reduction is SBD 8.78 M
  - Annual Benefit by the NRW reduction is **SBD 6.55 M** (Total annual Revenue – Total cost incurred)

Output 2- The procedure for NRW reduction is established through the pilot areas and LCZs

- **Indicator 2-1: A manual for NRW reduction measures is prepared**
  - This manual will consist of 3 components; NRW Reduction Measures; Leakage Detection Techniques; and Update of Database.
  - Manual will be prepared to include forms that are already in use during Phase 4 (Apr 2015-Oct 2015)

- **Indicator 2-2: The number of authorizations and disconnections of illegal connections is increased in the pilot project areas and LCZs.**
- 140 Illegal connection found in 15 pilot areas (**See Table 5**). That is **9.6% of total HH**.
- As a result of project, 38 illegals converted to valid customers (27.1%).
- 102(**72.9%) was disconnected.**

- **Indicator 2-3: The number of new service connections and replacement of malfunctioning customer meters is increased in the pilot project areas and LCZs.**

Newly Connected Households

- Out of total HH (1464) in Pilot project area, 268 is unconnected. (Not connected to SW service line) =**18.3%** (See table 6)
- As result of the Project, 31 HH (11.6%)connected to SW service. **88.4% remained unconnected**

Installation of Customer Meters

(See Table 7)

- The Project installed 974 brand new meters to customers within Pilot areas from 1000 meters procured by JICA
  - **378 meters to unmetered customers**
  - **596 meters to replace faulty meters**.

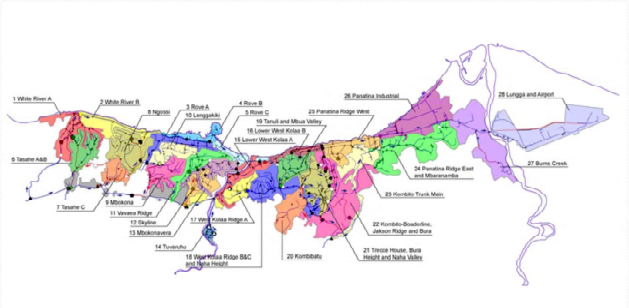
Output 3- NRW reduction is implemented in accordance with the procedure in pilot area and/or LCZ

- **Indicator 3-1: The number of pipe repairs is increased in the pilot project areas and LCZs**
  - Total of 191 leaks detected in Pilot areas and all of them fixed.
  - Before Project, rate of leak repair is 46 per month for whole Honiara (baseline).

Output 4- Water meter reading and billing process management are improved.

- **Indicator 4-1: Standard operating procedures (SOP) and training materials are formulated.**
  - Initial SOP for meter reading and billing system prepared in April 2013
  - This will be revised to include lessons learned through routine work.

Demarcation of DMAs- Honiara



District-Metered Area(DMA)

- Definition.
  - Its an isolated Metering Area where the Total flow into and out of the area is Monitored for DMA Management

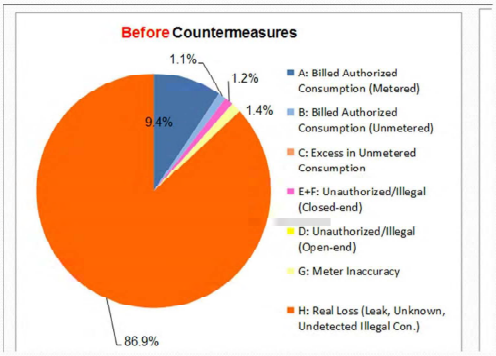
Total No. Of DMA

- Twenty Eight(28) DMA
  - Six (6)DMA with Pressure Management.
  - Twenty two(22) DMA with out Pressure Management.

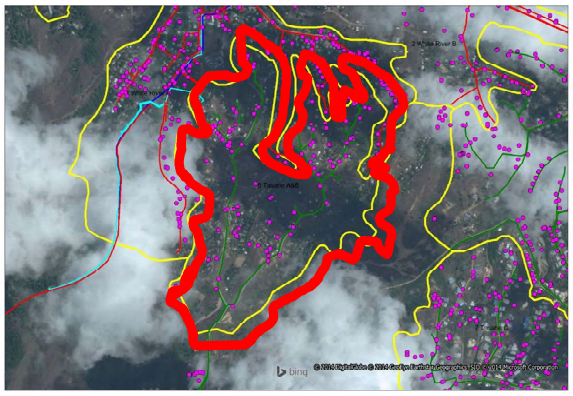
DMAs- in Progress

- Two DMAs
  - Tasahe A & B- With Pressure Control
  - West Kola ridge A- with Out Pressure Control

Base Line Data – Tasahe A & B

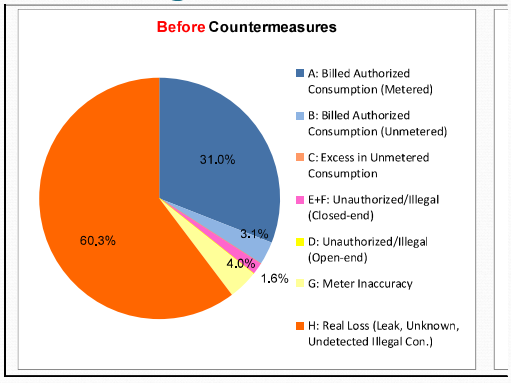


Example of a DMA Setting- Tasahe A & B



DMA- West Kola ridge A

West Kolaridge A – NRW Base Line



Issues and Challenges- cont.

Leakages Detections and effective Use of Equipments.

- Most pilot projects & DMA leakages detected by Visual checks and hence pipe routes deep cover with vegetations and hilly terrains.

Remedial.

Effective use of Leakages Detection in areas in town DMAs.(Listening Acoustic Mechanical & electronic & Correlator)

Issues & Challenges

Legalisation of Illegal Connections & New Services and Reconnection & Decrease in Customers – Pilot sites.

- Less customers legalised – 27.1% legalised
- Only 11.6 % of 268 Create new accounts or Reconnected
- 8.4% of the total customers were disconnected in the 15 Pilot.

Remedial.

- Awareness of water Tarrif frequent increase to customers
- Use of beneficiary pay principles.
- User pay policy(pay first before delivery of service)

Issues and Challenges- cont.

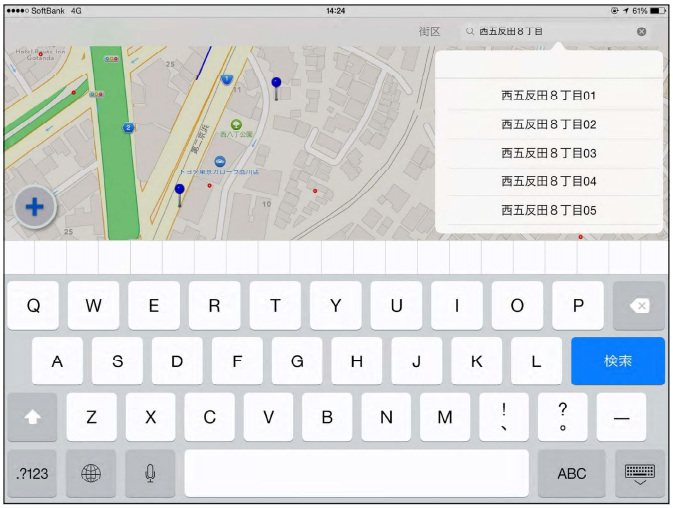
NRW Reduction in DMAs and DMA Management.

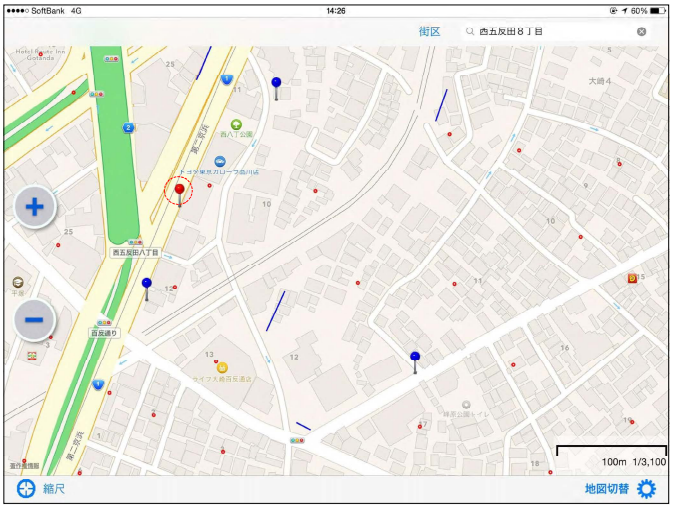
We have 28 DMA for NRW Reductions

- Challenges is DMA Management
  - Monitoring
  - Maintenance
- Process was not completed and the gap need to be closed to maintain the NRW reduction- Sustainability.
- Remedial.
  - Reorganisation of the Operations &(Finances & Customer Service Team) to do Monitoring and Maintenance of DMA.
  - JICA /DFAT to continue the support for - DMA Management

S13.3-27 GIS レビュー（GIS および GPS 概要）

に係る講義


街区
西五反田８丁目
西五反田８丁目01
西五反田８丁目02
西五反田８丁目03
西五反田８丁目04
西五反田８丁目05
検索
ABC


街区
西五反田８丁目
100m 1/3,100
縮尺
地図切替


属性値一覧
調査種別 : 細街路協議
番号 : ykhm-0002
調査内容 : 側溝の詰まり
備考 :
メモ :
調査状況
調査中
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保存しない
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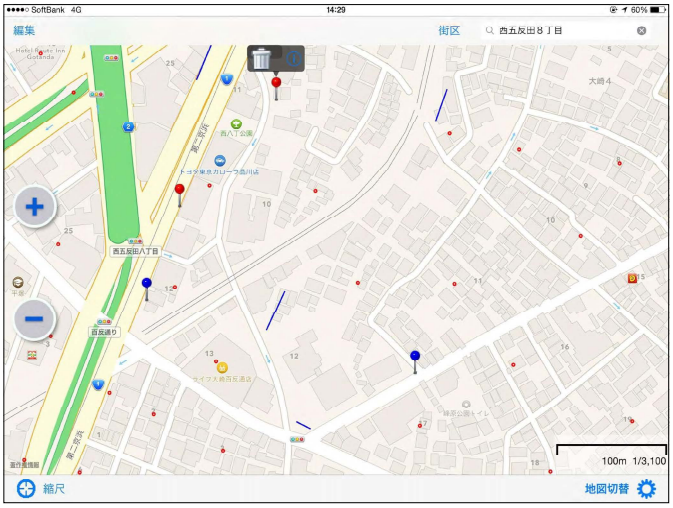
編集
街区
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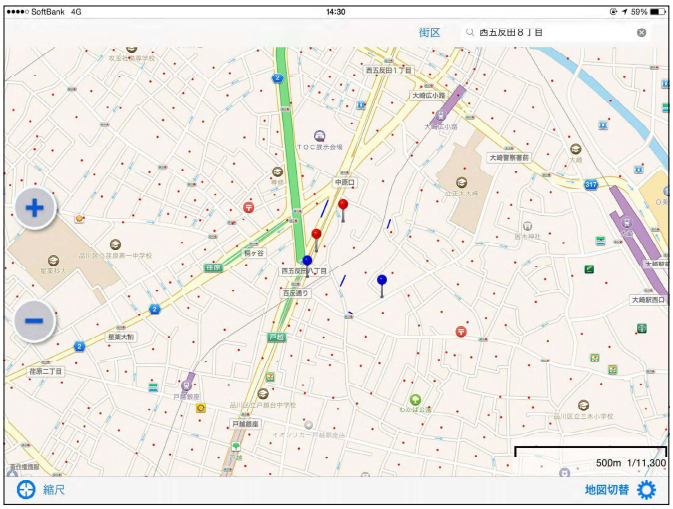

街区
西五反田８丁目
500m 1/11,300
縮尺
地図切替

S13.3-28 水道の基本計画検討と水理解析に係る講義（活動 1-3 および 3-1、3-2、3-4、3-8）

The Project
for
Improvement of Non-Revenue Water Reduction Capacity
for
Solomon Islands Water Authority
in Solomon Island

Examination on Basic Planning of Water Supply and Hydraulic Analysis for Activity 1-3, 3-1, 3-2, 3-4 and 3-8

May 2015

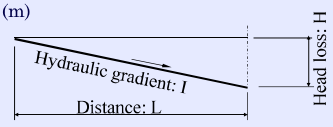
NRW Project Team

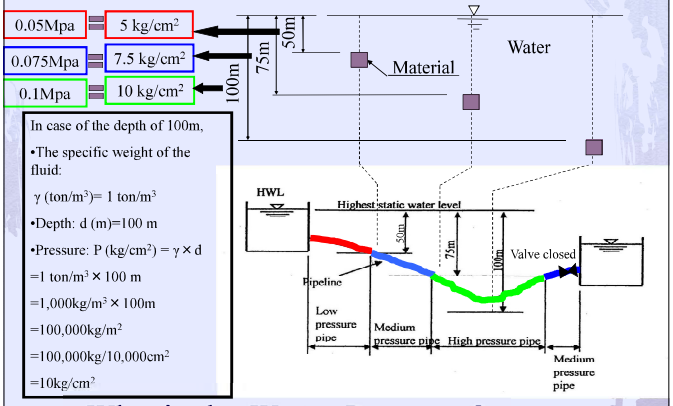
Head loss in the pipes

Head loss in the pipeline is expressed as follows:

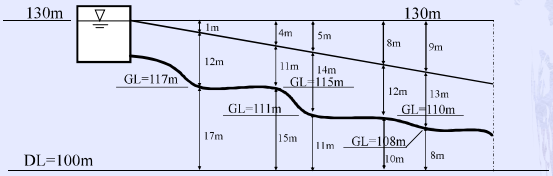
$H = I \times L, (I = H / L)$

Where,
H: Head loss (m)
I: Hydraulic gradient (dimensionless)
L: Distance (m)





What's the Water Pressure?



Energy exchange

due to **Bernoulli's relationship**

Head loss, effective water head and elevation head

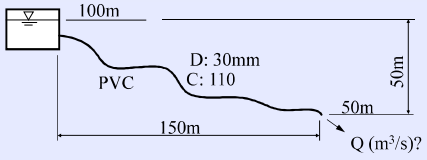
Hydraulic calculation of pipes

•The Hazen – Williams equation is most commonly used in water works engineering.
•The equation in various forms is given below.

- $I=10.666 \times C^{-1.85} \times D^{-4.87} \times Q^{1.85}$
- $D=1.6258 \times C^{-0.38} \times Q^{0.38} \times I^{-0.205}$
- $Q=0.27853 \times C \times D^{2.63} \times I^{0.54}$
- $V=0.35464 \times C \times D^{0.63} \times I^{0.54}$

Where,
I: Hydraulic gradient (dimensionless), C: Coefficient of roughness (dimensionless), D: Inner diameter of the pipes (m), Q: Flow rate (m^3/s), V: Velocity of water in the pipes (m/s)

Example No.1 on gravity flow



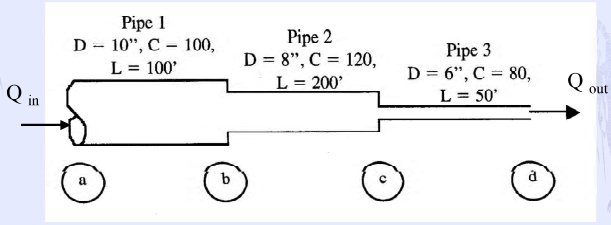
$Q = 0.27853 \times C \times D^{2.63} \times I^{0.54}$

$= 0.27853 \times 110 \times (30/1000)^{2.63} \times (50/150)^{0.54}$

$= 0.00167$ (m3/sec)

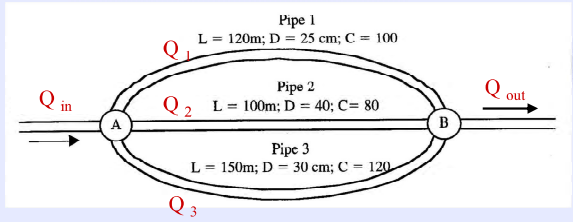
$\fallingdotseq 100$ (liter/min)

Series Pipe System



•The flow through each pipe is the same.
•Head losses vary between each segment.
•The total head loss from 'a' to 'd' is the sum of the head losses in individual pipes.

Parallel Pipe System



•The flow through each will be different.
•The energy loss in each pipe must be the same.
•$Q_{in} = Q_1 + Q_2 + Q_3 = Q_{out}$

Question 1

Estimate the water demand for a community whose population will reach 11,000 persons at the particular target year. The daily per capita water consumption for the community is 120 Lpcd. Calculate the design capacity of water treatment and that of the water distribution system. Water demand for fires is not considered.

Where,
Factor for peak hourly supply: 200 percent of average daily supply.
Factor for maximum daily supply: 110 percent of average daily supply.
NRW: 20 % of average daily demand.
Lpcd: Liter per capita per day

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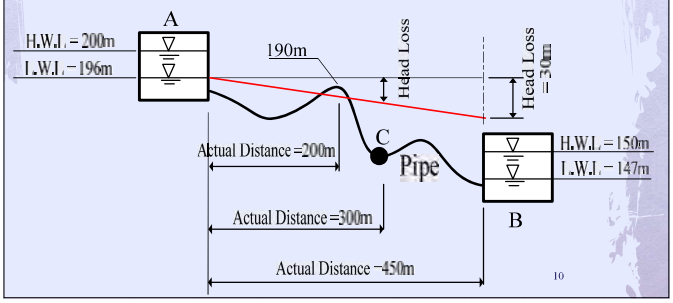
Question 2

Answer the following questions.
Minimum hydraulic gradient:
Average hydraulic gradient:
Head loss at C:
Is the water supplied from A to B?



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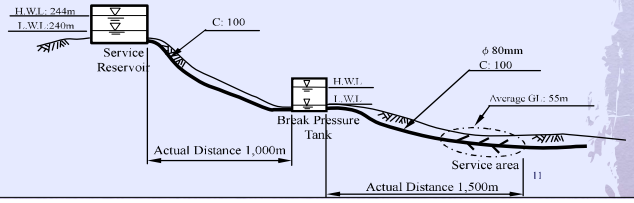
Question 3

The new project of water supply system was launched in Gizo. Water source of spring water was already secured. The plan is to convey the water disinfected by chlorination at water source to a service reservoir and to supply water of 640m³/day to service area. Then SW officer of Gizo negotiated with landowners for land acquisition of the service reservoir. However, some of owners did not approve of the land lease. Eventually, it was impossible to acquire the proposed land for the service reservoir, and SW was forced to acquire alternative land attitude of which is higher than the former proposed land. Therefore, water pressure must be reduced by a break pressure tank or Pressure Reducing Valve (PRV) or break pressure tank.
Answer the following questions.
In order to set maximum static head of 1Mpa in the service area, how much is ground elevation of the land for the break pressure tank proposed?
If the break pressure tank is not planned, how much is maximum static head in the service area?
How much is pipe diameter proposed between the service reservoir and the break pressure tank?
If the diameter of 80mm after the break pressure tank is proposed, how much is effective head in the service area?

Condition
Effective depth of the break pressure tank: 2 m
L.W.L. of the break pressure tank equals its ground level.
C: Coefficient of pipe roughness.



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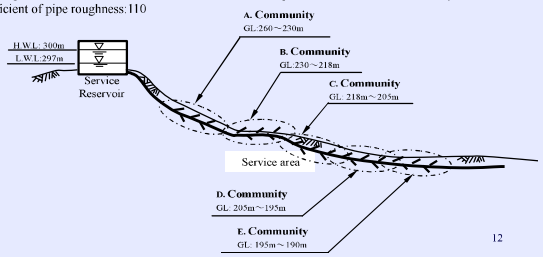
Question 4

When the pipes of PN10 are laid in the following community:
1. Is a break pressure tank required?
2. If required, in which community should the break pressure tank be located?
3. For which community will the break pressure tank be applied?
4. If the break pressure tank is required for above community, how much is approximately effective pressure at the community to be served by using pipes of φ80mm?

Design condition:
- Effective pressure should be at least 0.4Mpa in each village.
- If break pressure tank is required, the following condition will be applied:
  - Effective depth of the break pressure tank: 2 m
  - L.W.L. of the break pressure tank equals its ground level.
  - Pipe length is 200m and flow is 220m³/d between the break pressure tank and the community to be served
- Coefficient of pipe roughness:110



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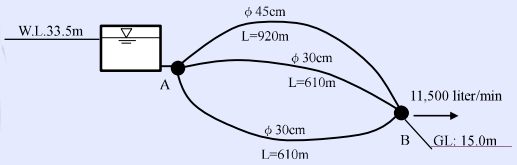
Question 5

Calculate the velocity, head loss and flow in each pipe of the network shown below. What will be the pressure at node B? Use C=100.



Almost everybody understood!
⇒Lecture to be skipped

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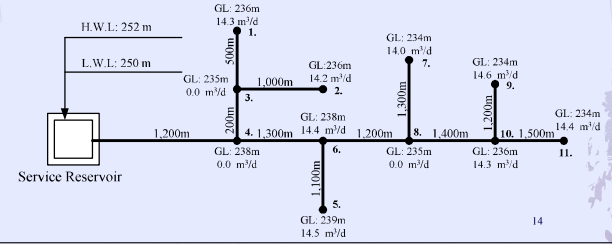
Question 6

the augmentation water supply project started carrying out in this year. The existing service reservoir will be continuously utilized because it has affordable capacity and all the pipelines will be augmented.
Answer the following questions.
1. Determine the pipe diameters and the effective heads (effective pressure) at each node.
2. If booster pumps is required at certain node on the route, which the route and the node are they? And how much should be pressurized by the pump?
3. Draw the hydraulic gradient line from the service reservoir to No. 11 through No.4, No.6, No.8, and No.10.

Condition
Coefficient (C) of pipe roughness for all: 100
0.1Mpa should be required for the minimum effective heads at each node.
Water demands are indicated at the each node.



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