ภาคผนวก

ผ.1 Source Code ของ GIS based Urban drainage management, v1.0 (GURDMAN)

```
Private Sub cmdProcess_Click()
   On Error GoTo xErr
   Dim ctlObj As Control
   'Dim xFrame As New Frame1
   Dim selectedYear As Integer
   'CtrlTop = 5
   Dim i As Integer
   Dim YearUse As Integer
   Dim TimeUsage As Double
   Dim retuPeriodLabel As String
   Dim DataSourceLabel As String

 For i = 0 To 5

      If Controls("OptionButton" & i).Value = True Then
         retuPeriodLabel = Controls("OptionButton" & i).Caption
         YearUse = i + 2
        Exit For
      End If
   Next i
      If OptionButton6.Value = True Then
      TimeUsage = Val(txtHr) / 60
   Else
```

```
    TimeUsage = txtHr
  End If

  Dim xRange As String
    If Controls("optSourceData1").Value = True Then
    xRange = "UserData2"
    DataSourceLabel = Controls("optSourceData1").Caption
  Else
    xRange = "IDFfromEachStation"
    DataSourceLabel = Controls("optSourceData2").Caption
  End If

  Dim result As Double
  result = Linterp(Range(xRange), YearUse, TimeUsage)
  txtQt = Format(result, "#.00")

  lblReturnPeriod.Caption = retuPeriodLabel
  lblDatasource.Caption = DataSourceLabel
  lblReturnI = txtQt
  Exit Sub
xErr:
  If Err = 1004 Then Resume Next
  Exit Sub
End Sub
```

```
Option Explicit
Const PI = 22 / 7
Dim PipeSize(1 To 15) As Currency
Dim StartRow As Integer
Dim xlApp As New Excel.Application 'Dim xlApp As Object


Private Sub cmdAreaTypeHelp_Click()
   Dim xForm As New frmTblCoTypeShow
   xForm.Show
End Sub


Private Sub cmdFindI_Click()
   Dim xForm As New frmFindI
   xForm.Controls(1).Value = txtTC
   xForm.Show
   Dim cCont As Control
   For Each cCont In xForm.Controls
      If TypeName(cCont) = "Label" Then
         If cCont.Name = "lblReturnPeriod" Then txtReturnPeriod = cCont.Caption
         If cCont.Name = "lblDatasource" Then txtRainDataSource = cCont.Caption
         If cCont.Name = "lblReturnI" Then txtI = cCont.Caption    'xForm!txtQt
      End If
   Next cCont
End Sub
```

```
Private Sub cmdFindQ_Click()
   txtQw = FindQw(txtQtWtUse, txtPeople, txtWasteWater)
   txtQ = Val(txtQr) + Val(txtQw)
   txtQForComputePipe = Val(txtAccumulateQ) + Val(txtQ)
End Sub

Private Sub cmdFindQr_Click()
   If txtI.Text = "" Or txtSumCA.Text = "" Then
      MsgBox "¡ÃØ³ÒµÃÇ¨ÊÍº ¤èÒ¤ÇÒÁà¢éÁ½¹ - I áÅÐ ¤èÒÊÑÁ»ÐÊÔ·¸Ôì¾×é¹·Õ C* è", vbInformation
   Else
      txtQr = FindQr(txtI, txtSumCA)
   End If
End Sub

Private Sub cmdFindTc_Click()
   If Controls("optTc1").Value = True Then
      If txtAreaSlope = "" Then
         MsgBox " ¡ÃØ³ÒºÑ¹·Ö¡¤èÒ S ", vbInformation, " ¤ÓàµÍ¹ "
      Else
         txtTC.Text = FindTc(Val(txtAreaLength), txtAreaSlope)
      End If
   ElseIf Controls("optTc2").Value = True Then
      txtAreaSlope.Text = "n/a"
      txtTC.Text = 5 + (Val(txtAreaLength) / 45)
   ElseIf Controls("optTc3").Value = True Then
```

```
        txtAreaSlope.Text = "n/a"
        txtTC.Text = 15 + (Val(txtAreaLength) / 45)
    End If
    txtTC.Text = Format(txtTC.Text, "#.00")
End Sub

Private Sub cmdNewDataEntry_Click()
    Call ClearForNewData
End Sub

Private Sub cmdSaveToSheet_Click()
    Dim AreaNumLine As Integer

    Dim rAreaNo As Integer
    Dim rAreaSize As Integer
    Dim rAreaType As Integer
    Dim rAreaDesc As Integer
    Dim rAreaC As Integer
    Dim rAreaC_A As Integer
    Dim i As Integer
    ' - -- --  Zone ----
    'StartRow = Val(Me.Caption)
    Cells(StartRow, 1) = txtZoneNo.Value
    Cells(StartRow, 2) = txtZoneNo.Value + 1
    Cells(StartRow, 3) = Chr(64 + txtZoneNo.Value)
```

```
Cells(StartRow, 4) = txtAreaLength.Value
Cells(StartRow, 5) = txtAreaSlope.Value
Cells(StartRow, 6) = txtTC.Value
Cells(StartRow, 7) = txtI.Value

rAreaNo = 7
rAreaSize = 38
rAreaType = 23
rAreaDesc = 28
rAreaC = 33
rAreaC_A = 43


AreaNumLine = StartRow
For i = 0 To 4
   If Controls("TextBox" & rAreaSize).Text = "" Then Exit For

   Cells(StartRow + i, 8) = Controls("TextBox" & rAreaNo).Value
   Cells(StartRow + i, 9) = Controls("TextBox" & rAreaSize).Value
   Cells(StartRow + i, 10) = Controls("TextBox" & rAreaDesc).Value
   'Cells(StartRow + i, 9) = Controls("TextBox" & rAreaC).Value
   AreaNumLine = AreaNumLine + 1
   rAreaNo = rAreaNo + 1
   rAreaSize = rAreaSize + 1
   rAreaType = rAreaType + 1
```

```
        rAreaDesc = rAreaDesc + 1
        rAreaC = rAreaC + 1
        rAreaC_A = rAreaC_A + 1
    Next i
    Cells(StartRow, 11) = txtQr.Value
    Cells(StartRow, 12) = txtQw.Value
    Cells(StartRow, 13) = txtQ.Value
    Cells(StartRow, 14) = txtAccumulateQ.Value
    Cells(StartRow, 15) = txtQForComputePipe.Value
    Cells(StartRow, 16) = txtS.Value
    'Cells(StartRow, 18) = txt_n.Value
    'Cells(StartRow, 19) = txtD.Value
    Cells(StartRow, 17) = txtV.Value
    Cells(StartRow, 18) = txtDfinal.Value
    StartRow = AreaNumLine
    txtZoneNo = txtZoneNo.Value + 1
    txtAccumulateQ = txtQForComputePipe
    txtQForComputePipe = 0
End Sub
Sub ClearForNewData()

    Dim rAreaNo As Integer
    Dim rAreaSize As Integer
    Dim rAreaType As Integer
    Dim rAreaDesc As Integer
```

```
Dim rAreaC As Integer
Dim rAreaC_A As Integer
Dim i As Integer


rAreaNo = 7
rAreaSize = 38
rAreaType = 23
rAreaDesc = 28
rAreaC = 33
rAreaC_A = 43

' - -- --  Zone ----
'StartRow = Val(Me.Caption)
'txtZoneNo = ""

txtAreaLength = ""
txtAreaSlope = "n/a"
txtTC = ""
txtI = ""

For i = 0 To 4
   'If Controls("TextBox" & rAreaSize).Text = "" Then Exit For
   Controls("TextBox" & rAreaSize) = ""
   Controls("TextBox" & rAreaType) = ""
```

```
    Controls("TextBox" & rAreaDesc) = ""
    Controls("TextBox" & rAreaC) = ""
    Controls("TextBox" & rAreaC_A) = ""

    rAreaNo = rAreaNo + 1
    rAreaSize = rAreaSize + 1
    rAreaType = rAreaType + 1
    rAreaDesc = rAreaDesc + 1
    rAreaC = rAreaC + 1
    rAreaC_A = rAreaC_A + 1
Next i

txtSumCA = ""
txtQr = ""
'txtQtWtUse = ""
'txtPeople = ""
'txtWasteWater = ""
txtQw = ""
txtQ = ""
'txtS = ""
'txt_n = ""
txtD = ""
txtV = ""
txtDfinal = ""
End Sub
```

```
Private Sub TextBox23_AfterUpdate()
   TextBox28.Text = LookupRange(TextBox23.Text, "CoRunofDatafRange", 1, 2)
   TextBox33.Text = LookupRange(TextBox23.Text, "CoRunofDatafRange", 1, 5)

   TextBox43.Text = Val(TextBox38.Text) * Val(TextBox33.Text)
   txtSumCA.Text = Val(txtSumCA.Text) + Val(TextBox43.Text)
End Sub

Private Sub TextBox24_AfterUpdate()
   TextBox29.Text = LookupRange(TextBox24.Text, "CoRunofDatafRange", 1, 2)
   TextBox34.Text = LookupRange(TextBox24.Text, "CoRunofDatafRange", 1, 5)

   TextBox44.Text = Val(TextBox39.Text) * Val(TextBox34.Text)
   txtSumCA.Text = Val(txtSumCA.Text) + Val(TextBox44.Text)

End Sub
Private Sub TextBox25_AfterUpdate()
   TextBox30.Text = LookupRange(TextBox25.Text, "CoRunofDatafRange", 1, 2)
   TextBox35.Text = LookupRange(TextBox25.Text, "CoRunofDatafRange", 1, 5)

   TextBox45.Text = Val(TextBox40.Text) * Val(TextBox35.Text)
   txtSumCA.Text = Val(txtSumCA.Text) + Val(TextBox45.Text)
End Sub
Private Sub TextBox26_AfterUpdate()
   TextBox31.Text = LookupRange(TextBox26.Text, "CoRunofDatafRange", 1, 2)
```

```
    TextBox36.Text = LookupRange(TextBox26.Text, "CoRunofDatafRange", 1, 5)
    TextBox46.Text = Val(TextBox41.Text) * Val(TextBox36.Text)
    txtSumCA.Text = Val(txtSumCA.Text) + Val(TextBox46.Text)
End Sub

Private Sub TextBox27_AfterUpdate()
    TextBox32.Text = LookupRange(TextBox27.Text, "CoRunofDatafRange", 1, 2)
    TextBox37.Text = LookupRange(TextBox27.Text, "CoRunofDatafRange", 1, 5)

    TextBox47.Text = Val(TextBox42.Text) * Val(TextBox37.Text)
    txtSumCA.Text = Val(txtSumCA.Text) + Val(TextBox47.Text)
End Sub

Private Sub cmdComputeD_Click()
    Dim Q As Currency
    Dim n As Currency
    Dim S As Currency
    Dim D As Currency
    Q = Val(txtQForComputePipe)
    n = Val(txt_n)
    S = Val(txtS)

    D = (Q * n * 4 ^ (5 / 3)) / (PI * S ^ (1 / 2))
    D = (D ^ 3) ^ (1 / 8)
       txtD = D
```

```
    If D < Val(txtDcfg) Then
        MsgBox " ¤èÒ D ¹éÍÂ¡ÇèÒ¤èÒÓ¡ÓË¹´ " + txtDcfg.Text + " ´Ñ§¹Ñé¹¨Ö§àÅ×Í¡¤èÒ¡ÓË¹´ ", vbCritical,
"¤Óàµ×Í¹"
        txtUsedD = txtDcfg
    Else
        txtUsedD = D
    End If
End Sub
Private Sub cmdComputeV_Click()
    Dim V As Currency
    Dim Q As Currency
    Dim n As Currency
    Dim S As Currency
    Dim D As Currency
    Dim newD As Currency
    Dim newV As Currency
    Dim i As Integer

    Q = Val(txtQForComputePipe)
    D = Val(txtUsedD)
    n = Val(txt_n)
    S = Val(txtS)

    V = (4 * Q) / (PI * D ^ 2)
        txtV = V
```

```
    If V < Val(txtVcfg) Then
        MsgBox " ¤èÒ V ¹éíÂ¡ÇèÒ¤èÒÓ¡ÓË¹´ " + txtVcfg.Text + " ´Ñ§¹Ñé¹¨Ö§àÅ×Í¡¤èÒ¡ÓË¹´ ", vbCritical,
"¤Óàµ×Í¹"
        txtUsedV = txtVcfg
        newV = Val(txtVcfg)

        newD = (newV * n * 4 ^ (2 / 3)) / (S ^ (1 / 2))
        'newD = (newD ^ 3) ^ (1 / 2)
        newD = (newD ^ (3 / 2))

        txtNewD = newD
    Else
        txtNewD = D
    End If

    '---------------------- ¤Ñ´àÅ×Í¡¢¹Ò´·èÍ ------------------------------
    For i = 1 To 15
        If Val(txtNewD) < PipeSize(i) Then
            txtDfinal = PipeSize(i)
            Exit For
        End If
    Next i
End Sub
```

```
Private Sub opt_n1_Click()
   txt_n = opt_n1.Tag
End Sub

Private Sub opt_n2_Click()
   txt_n = opt_n2.Tag
End Sub

Private Sub UserForm_Initialize()
   Dim i As Integer
   Dim xStr As String
   xStr = ""
   For i = 1 To 15
      PipeSize(i) = 0.3 + (i / 10)
      xStr = xStr & ", " & PipeSize(i)
   Next i

   'lblPipeSize.Caption = xStr
   txt_n = 0.017 'opt_n1.Tag

   StartRow = 5
   txtAccumulateQ.Text = 0
   txtAreaLength.SetFocus
End Sub
```

```
Private Sub CommandButton1_Click()
    Unload Me
End Sub

Private Sub UserForm_Activate()
    On Error GoTo xErr

    'txtHr = Format(Range("F11"), "#,###,##0.00000")
    'txtHr = Format(txtTC, "#,###,##0.00000")
    Exit Sub
xErr:
    If Err = 1004 Then Resume Next
End Sub

Function FindTc(L As Currency, S As Currency) As Currency
    L = L * 0.3048 ' »ÃÑºË¹èÇÂ
    FindTc = 0.0078 * (L) ^ (0.77) * S ^ (-0.385)
End Function

Function FindQr(i As Currency, sumCA As Currency) As Currency
    FindQr = 0.278 * 10 ^ (-6) * i * sumCA
End Function
```

```
Function FindQw(QtWaterUse As Currency, QtPeople As Currency, QtWasteWater As Currency) As
Currency

   Dim avgWasteWater As Currency

   Dim M As Currency


   avgWasteWater = QtWaterUse * (QtWasteWater / 100) * QtPeople

   avgWasteWater = avgWasteWater * 10 ^ (-6)  ' Âº.Â

   M = 1 + (14 / (4 + Sqr(QtPeople / 1000)))


   FindQw = M * avgWasteWater

   'FindQw = FindQw / 1000

   'FindQw = 0.02


End Function


Function FindAllQ(Qr As Currency, Qw As Currency) As Currency

   FindAllQ = Qr + Qw

End Function


Function FindD(L As Currency, S As Currency) As Currency

   FindD = 0.0078 * (F8 * 0.3048) ^ (0.77) * F9 ^ (-0.385)

End Function
```

```
Function LookupRange(xData As Variant, xRange As String, LookupColumn As Integer, ReturnCol As Integer) As Variant
   Dim ra As Excel.Range
   Dim x As Excel.Range
   Set ra = Range(xRange)

   Set x = ra.Columns(LookupColumn).Find(xData)
   If x Is Nothing Then
      LookupRange = "-" 'Null
   Else
      LookupRange = x.Offset(0, ReturnCol - 1).Value
   End If
End Function
```

ผ.2 Source Code ของ Linterp Function

```
Public Function Linterp(Tbl As Range, ColUsage As Integer, xValue As Double) As Variant
    ' linear interpolator / extrapolator

   Dim nRow As Long
   Dim iLo As Long, iHi As Long

   nRow = Tbl.Rows.Count
   If nRow < 2 Or Tbl.Columns.Count < 2 Then
      Linterp = CVErr(xlErrValue)
      Exit Function '--------------------------------------------------------->
   End If

   If xValue < Tbl(1, 1) Then ' xValue < xmin, extrapolate from first two entries
      iLo = 1
      iHi = 2
   ElseIf xValue > Tbl(nRow, 1) Then ' xValue > xmax, extrapolate from last two entries
      iLo = nRow - 1
      iHi = nRow
   Else
      iLo = Application.Match(xValue, Application.Index(Tbl, 0, 1), 1)
      If Tbl(iLo, 1) = xValue Then ' xValue is exact from table
         Linterp = Tbl(iLo, ColUsage)
         Exit Function '--------------------------------------------------------->
      Else ' xValue is between tabulated values, interpolate
         iHi = iLo + 1
      End If
   End If

   Linterp = Tbl(iLo, ColUsage) + (Tbl(iHi, ColUsage) - Tbl(iLo, ColUsage)) * (xValue - Tbl(iLo, 1)) / (Tbl(iHi, 1) - Tbl(iLo, 1))

End Function
```