

AUTORITA' DI BACINO  
DI RILIEVO REGIONALE



PROVINCIA  
DI SAVONA

## PIANO DI BACINO BOTTASSANO

Piano stralcio per la tutela dal rischio idrogeologico  
di cui all'art.1, comma 1 del D.L. 11/06/1998 n.180,  
convertito in legge 03/08/1998 n.267 e s.m.

# **VERIFICHE IDRAULICHE**

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Approvato con D.C.P. n.47 del 25/11/2003

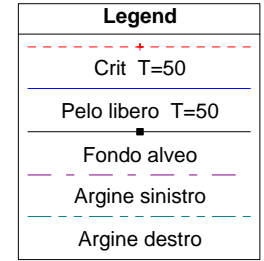
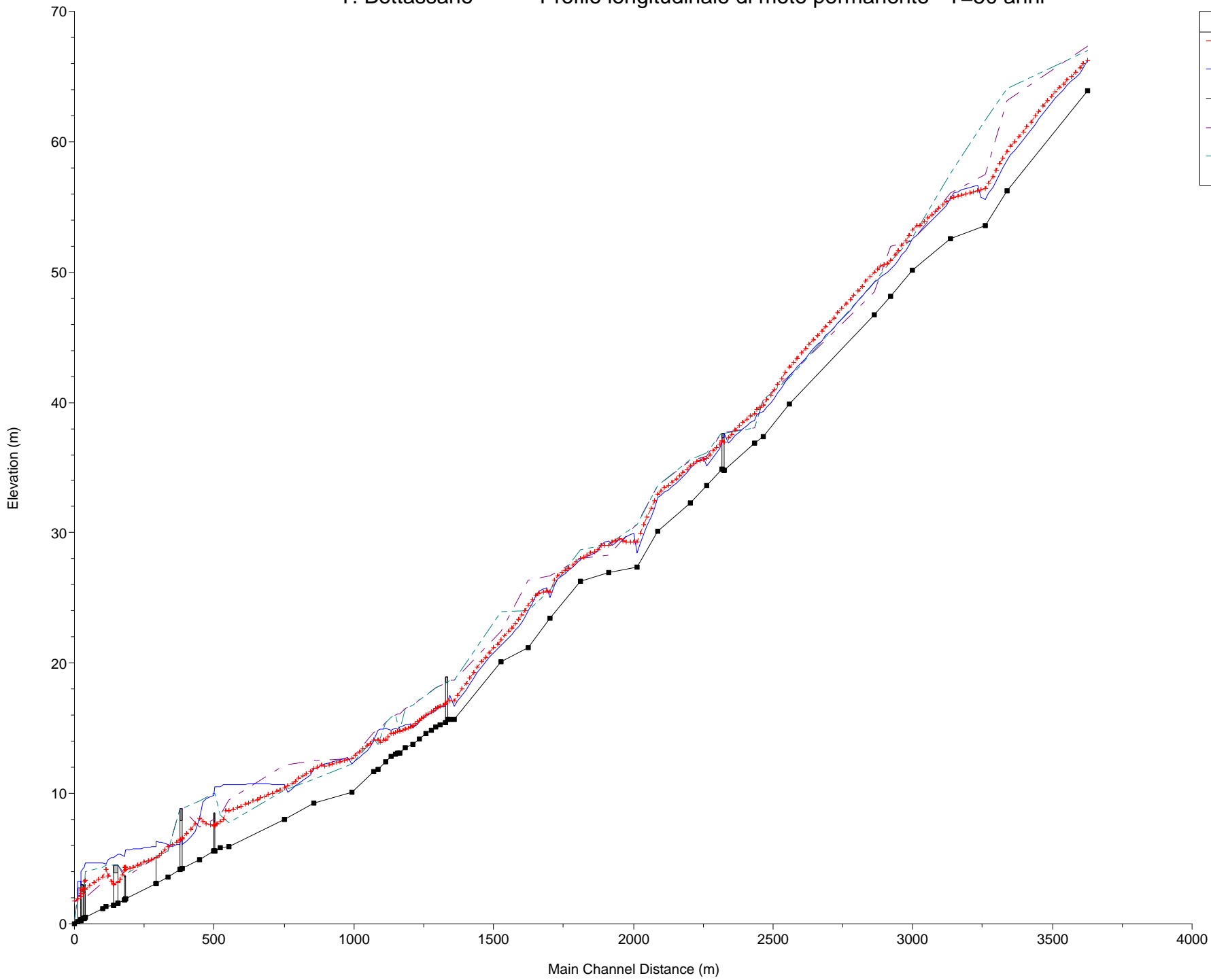


**PROFILI DI RIGURGITO IN CONDIZIONI DI MOTO  
PERMANENTE PER LE PORTATE T=50, 200, 500 ANNI**

**T. BOTTASSANO**

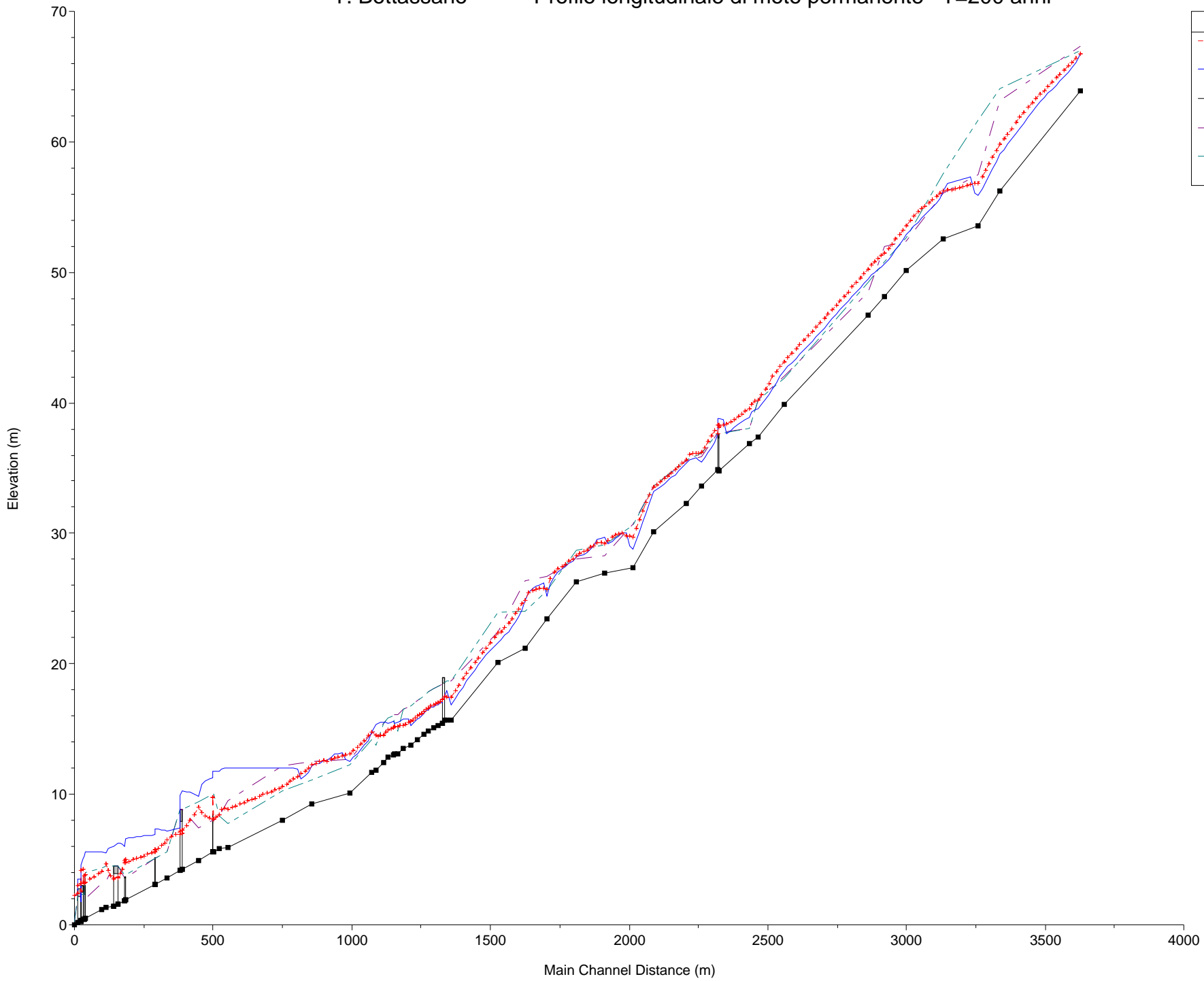
T. Bottassano

Profilo longitudinale di moto permanente T=50 anni



T. Bottassano

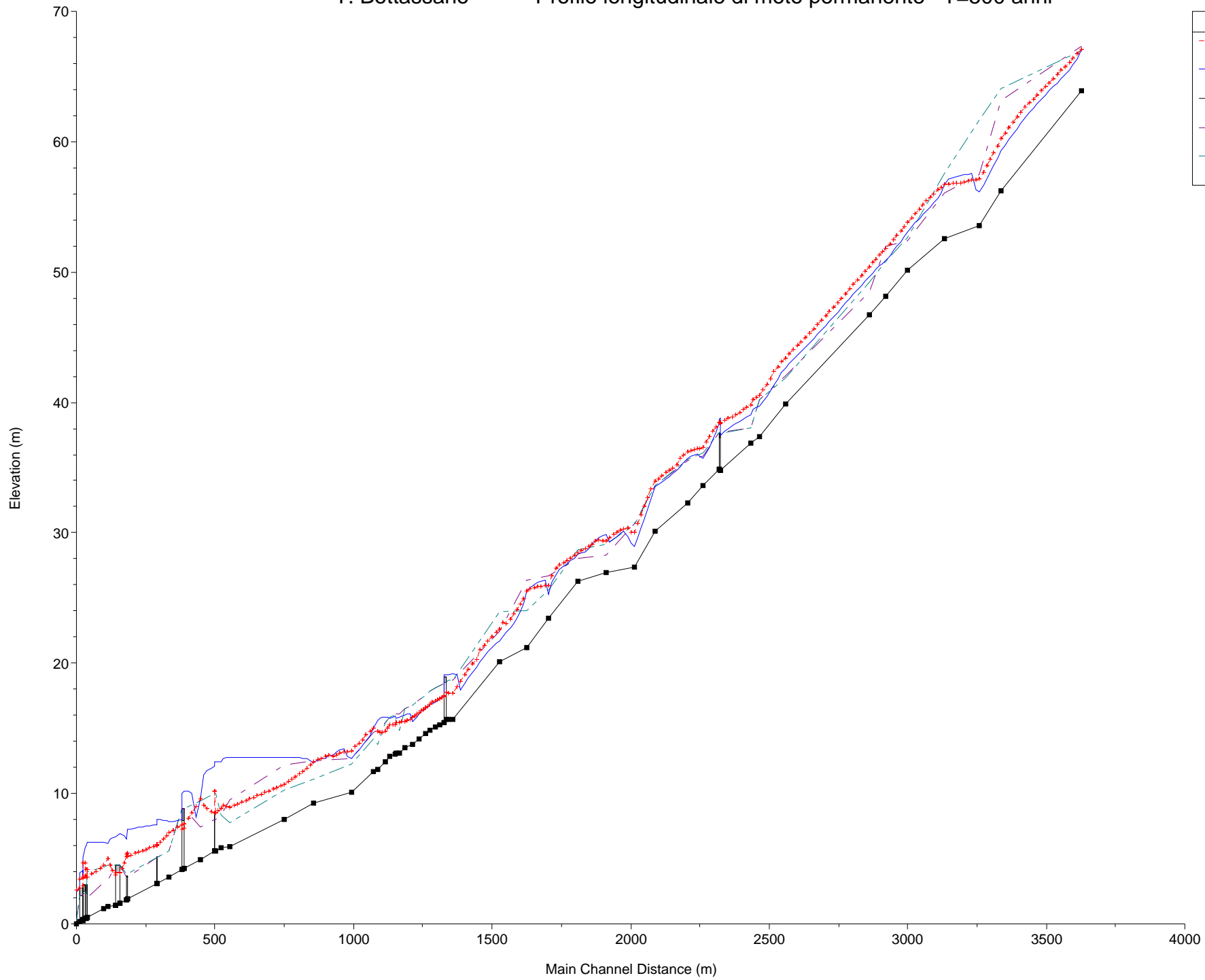
Profilo longitudinale di moto permanente T=200 anni



| Legend |                   |
|--------|-------------------|
| —+—    | Crit T=200        |
| —      | Pelo libero T=200 |
| —■—    | Fondo alveo       |
| - - -  | Argine sinistro   |
| - - -  | Argine destro     |

T. Bottassano

Profilo longitudinale di moto permanente T=500 anni



| Legend  |                   |
|---------|-------------------|
| ---+--- | Crit T=500        |
| —       | Pelo libero T=500 |
| —■—     | Fondo alveo       |
| - - -   | Argine sinistro   |
| - - -   | Argine destro     |

**GEOMETRIA DELLE SEZIONI ED ALTEZZA DEL PELO  
LIBERO IN CONDIZIONI DI MOTO PERMANENTE  
PER LE PORTATE T=50, 200, 500 ANNI**

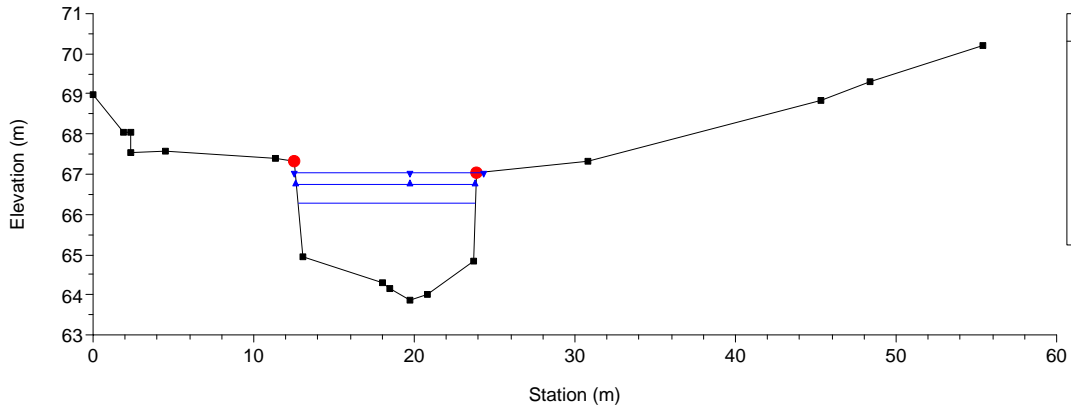
**T. BOTTASSANO**

DALLA SEZ. 64  
ALLA SEZ. 1

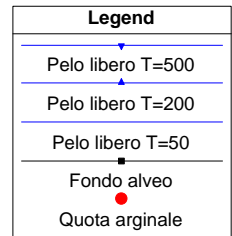
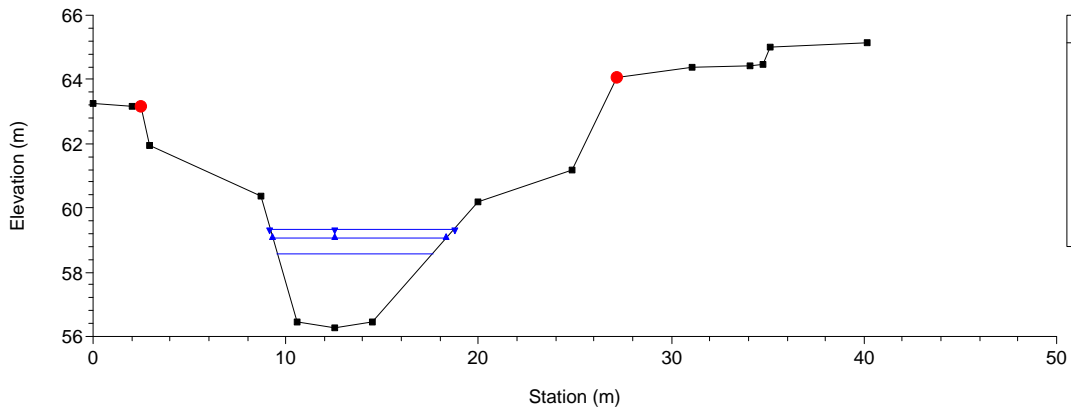
# TORRENTE BOTTASANO

## Sezioni trasversali

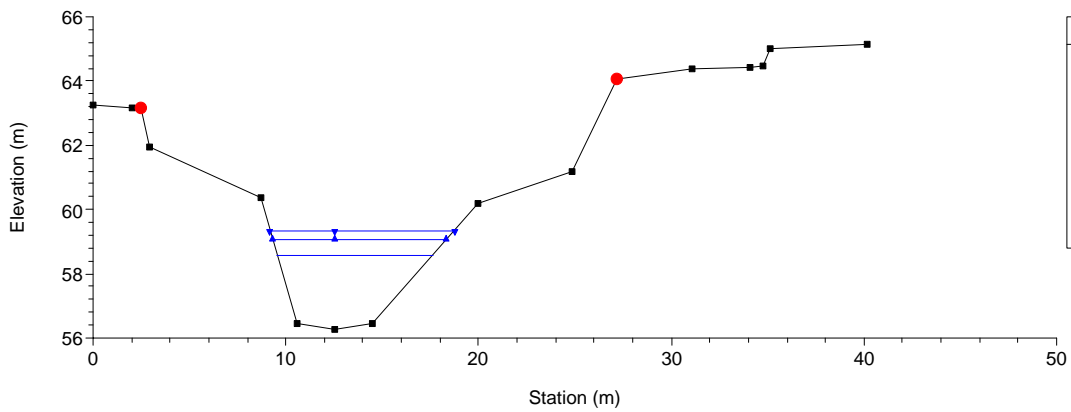
RS = 64



RS = 63

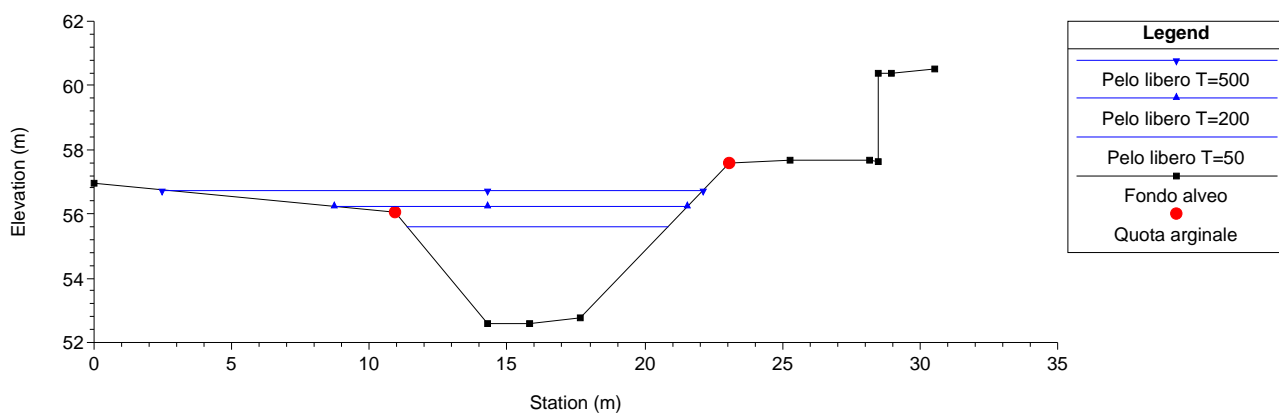


RS = 63

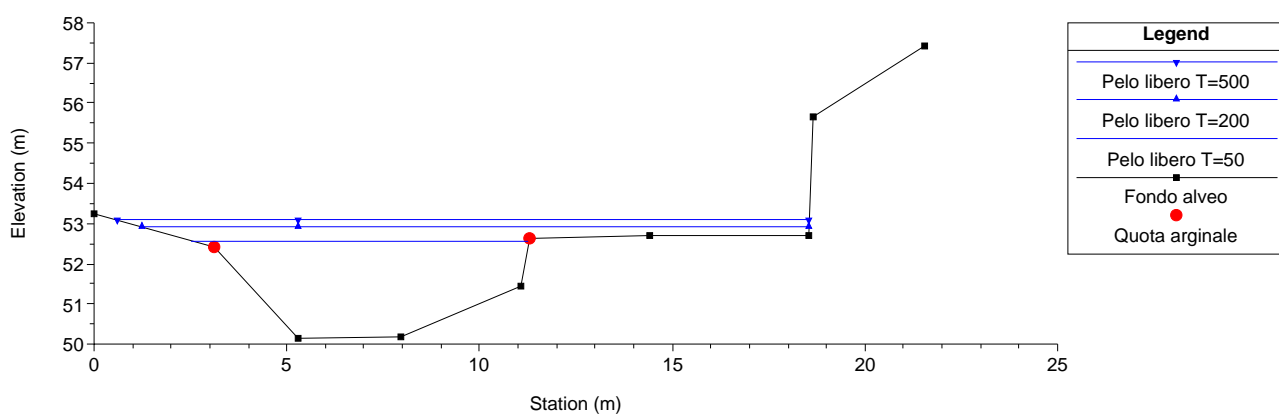




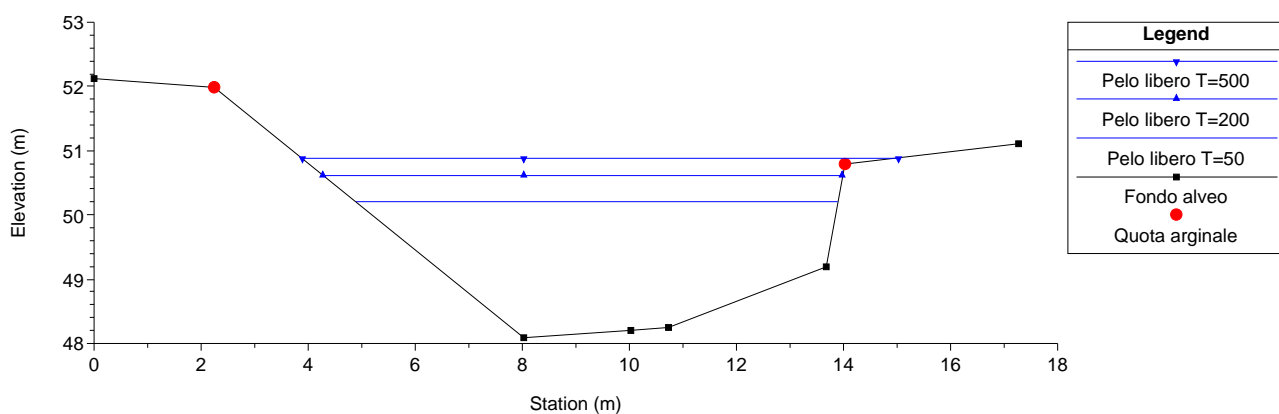
RS = 61



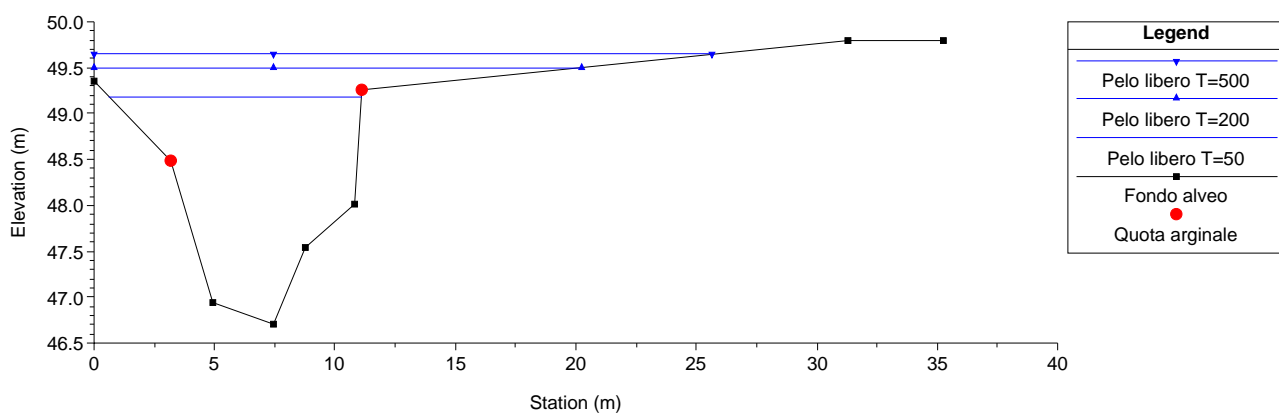
RS = 60



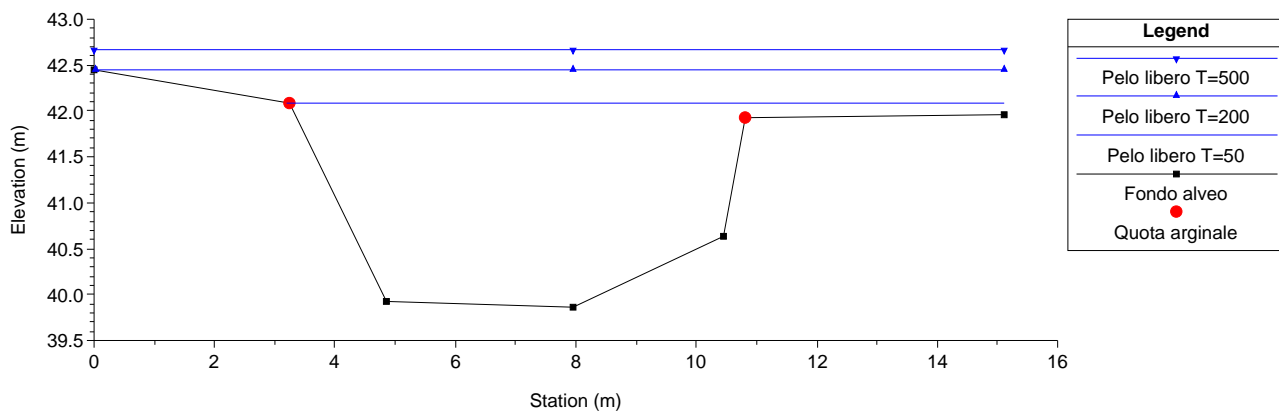
RS = 59



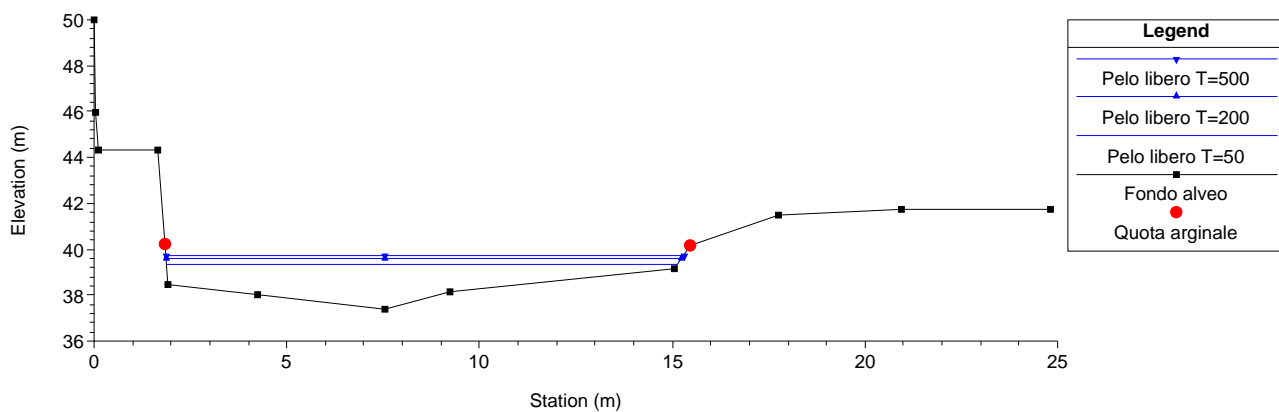
RS = 58



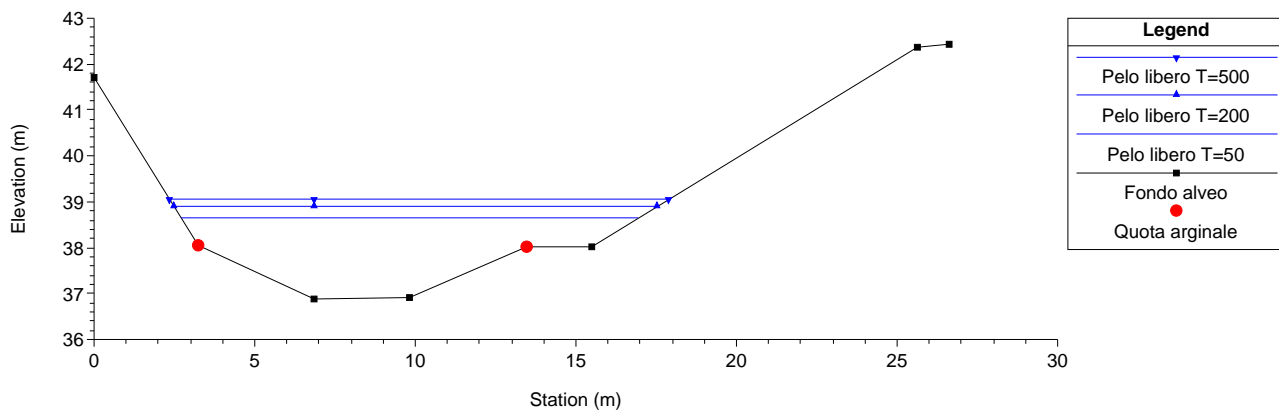
RS = 57



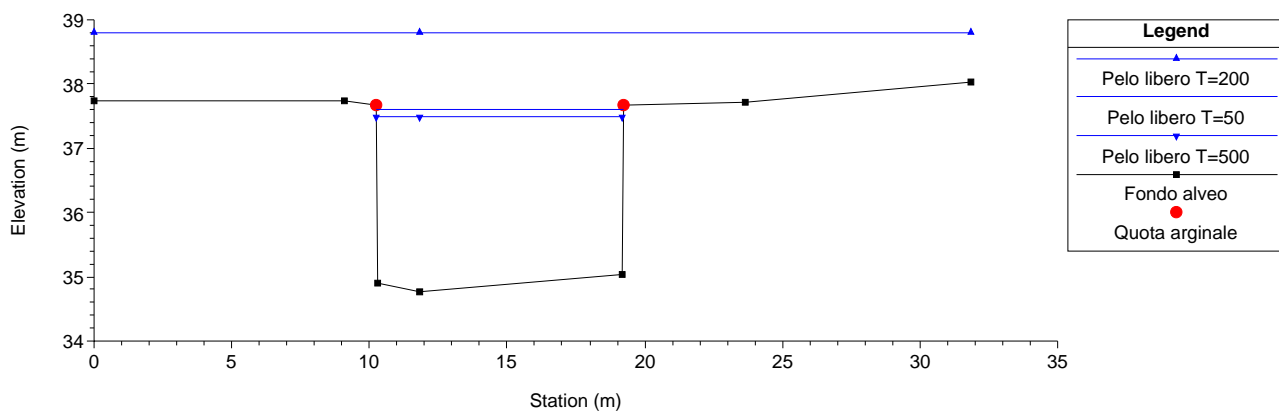
RS = 56



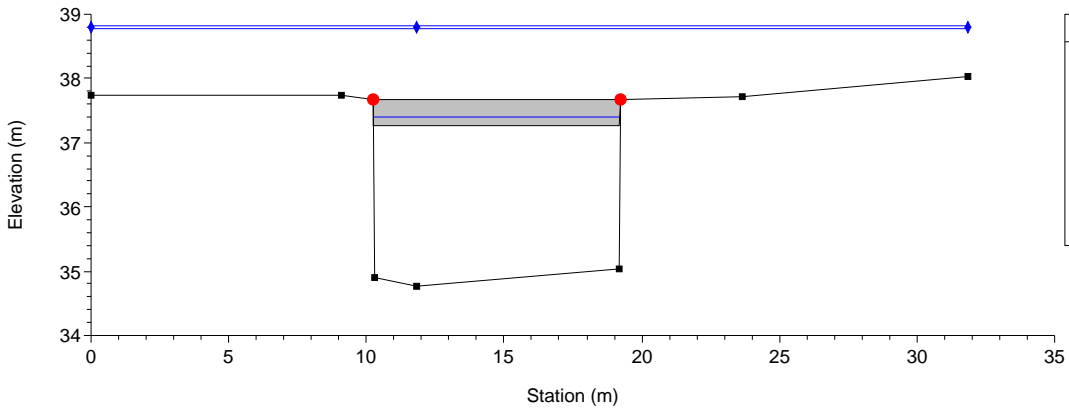
RS = 55



RS = 54

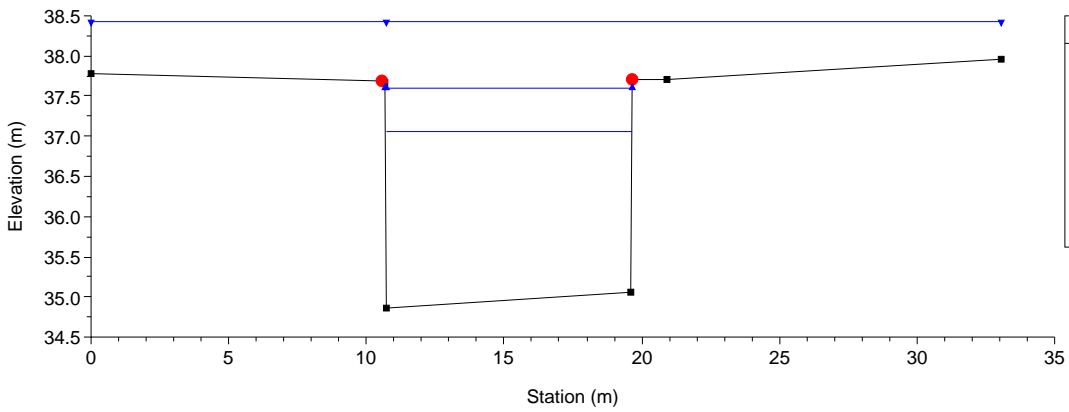


RS = 53.5 BR U



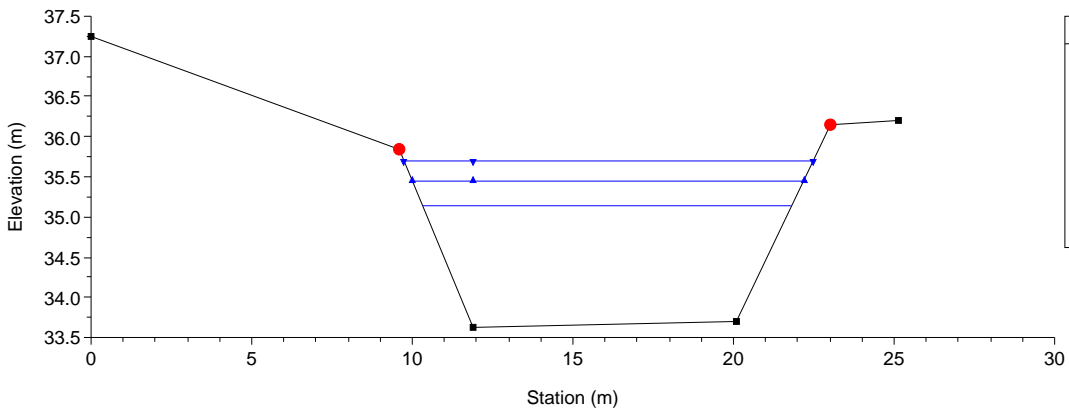
| Legend |                   |
|--------|-------------------|
| ▲      | Pelo libero T=200 |
| ▼      | Pelo libero T=500 |
| ■      | Pelo libero T=50  |
| ●      | Fondo alveo       |
| ●      | Quota arginale    |

RS = 53



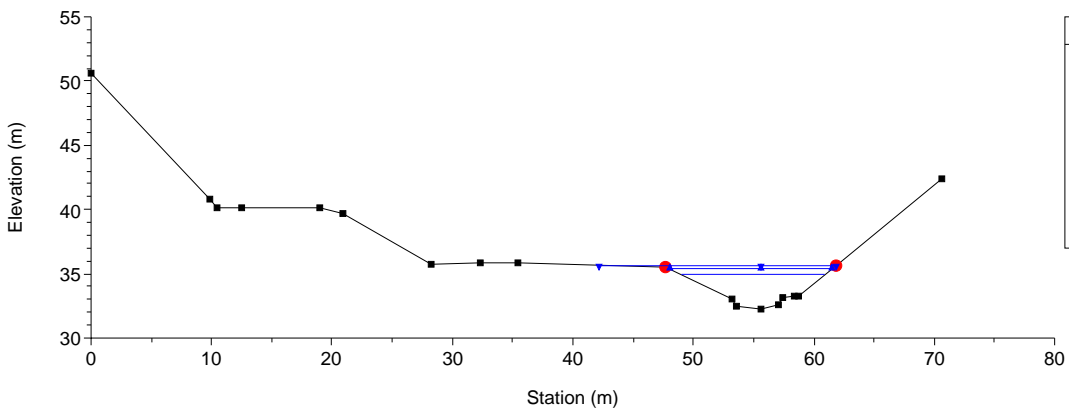
| Legend |                   |
|--------|-------------------|
| ▼      | Pelo libero T=500 |
| ▲      | Pelo libero T=200 |
| ■      | Pelo libero T=50  |
| ●      | Fondo alveo       |
| ●      | Quota arginale    |

RS = 52



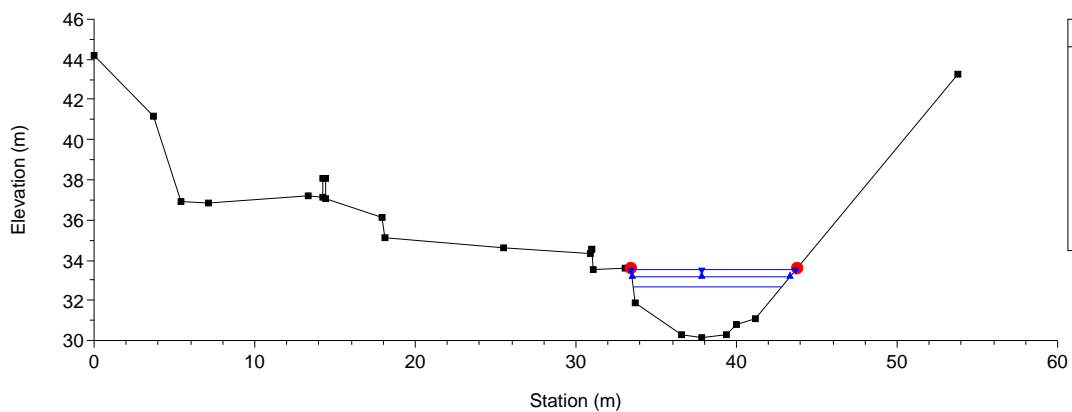
| Legend |                   |
|--------|-------------------|
| ▼      | Pelo libero T=500 |
| ▲      | Pelo libero T=200 |
| ■      | Pelo libero T=50  |
| ●      | Fondo alveo       |
| ●      | Quota arginale    |

RS = 51

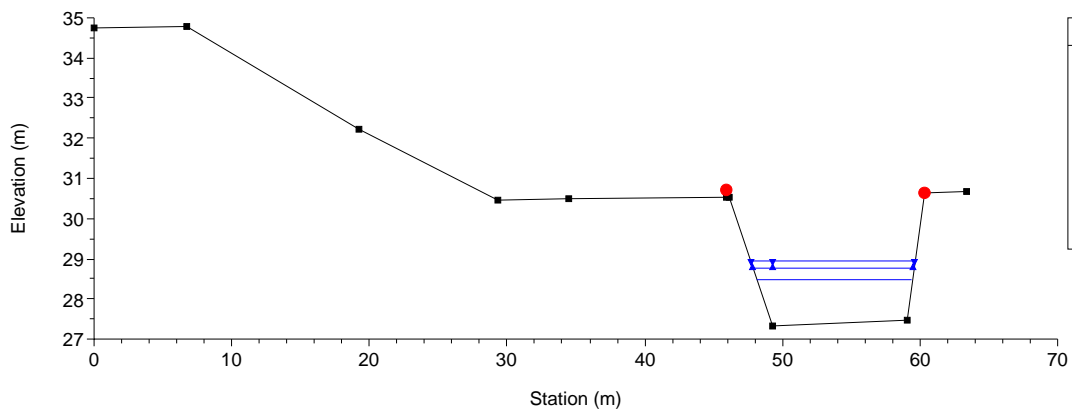


| Legend |                   |
|--------|-------------------|
| ▼      | Pelo libero T=500 |
| ▲      | Pelo libero T=200 |
| ■      | Pelo libero T=50  |
| ●      | Fondo alveo       |
| ●      | Quota arginale    |

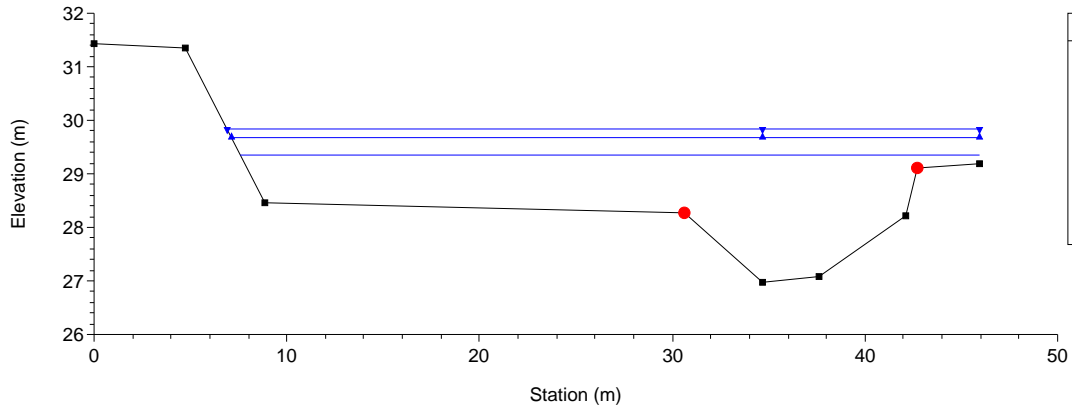
RS = 50



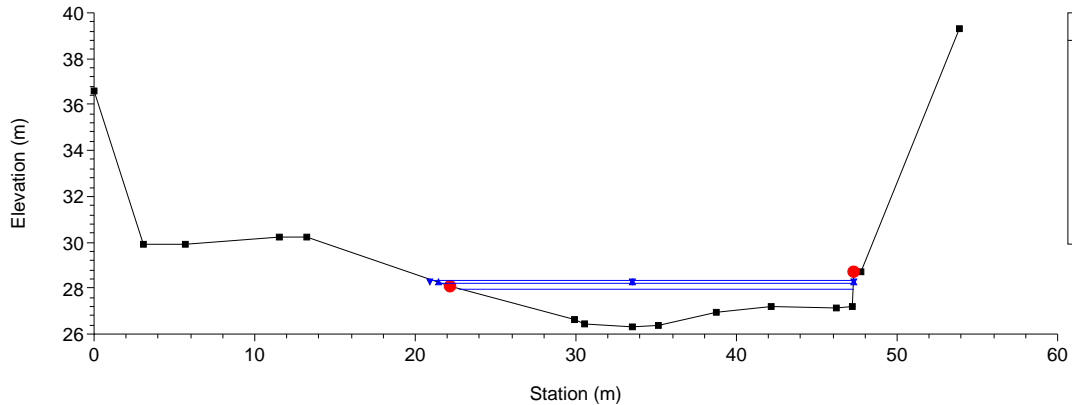
RS = 49



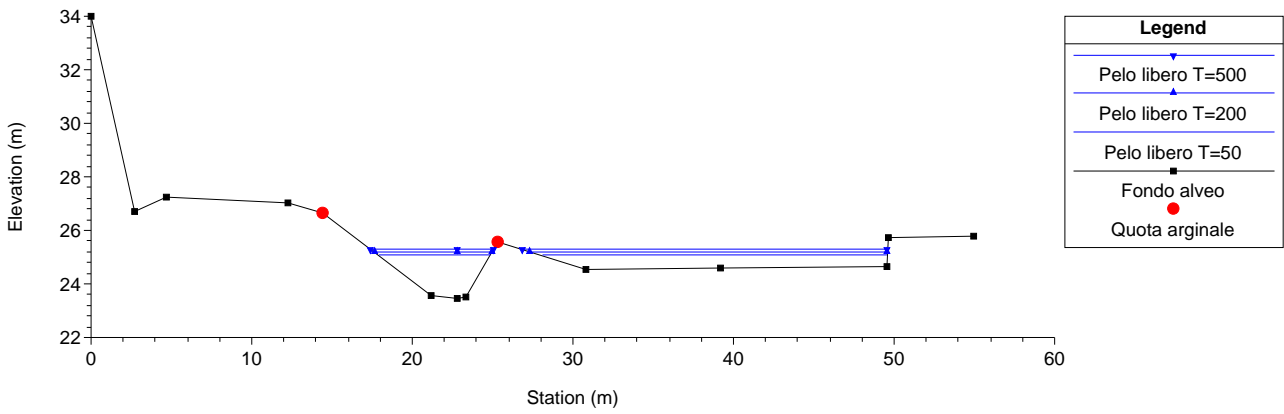
RS = 48



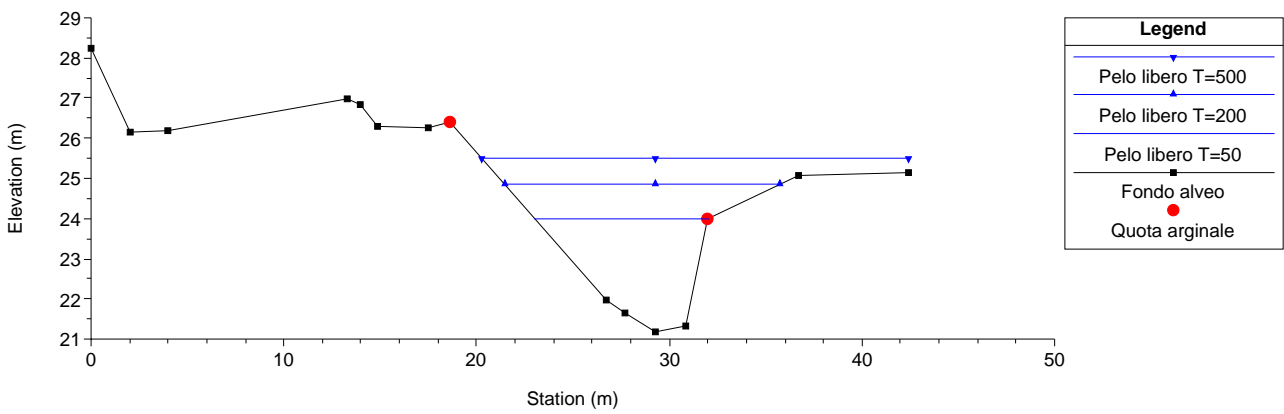
RS = 47



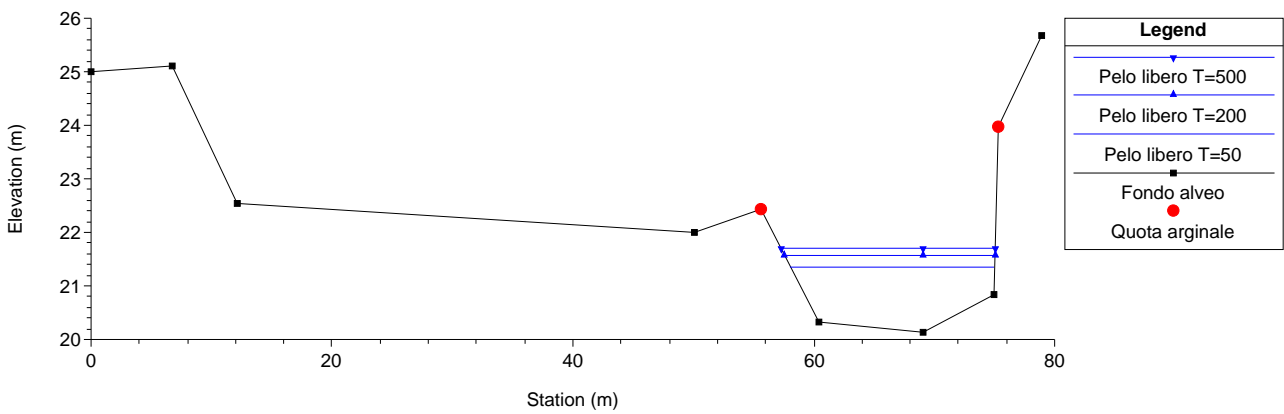
### RS = 46



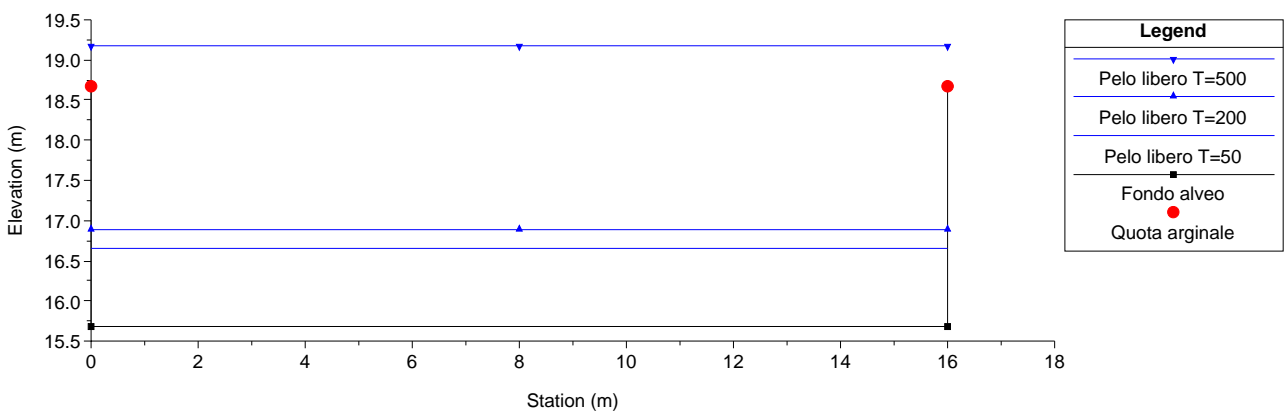
### RS = 45



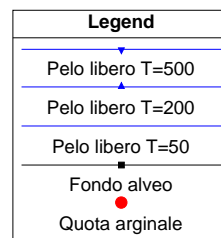
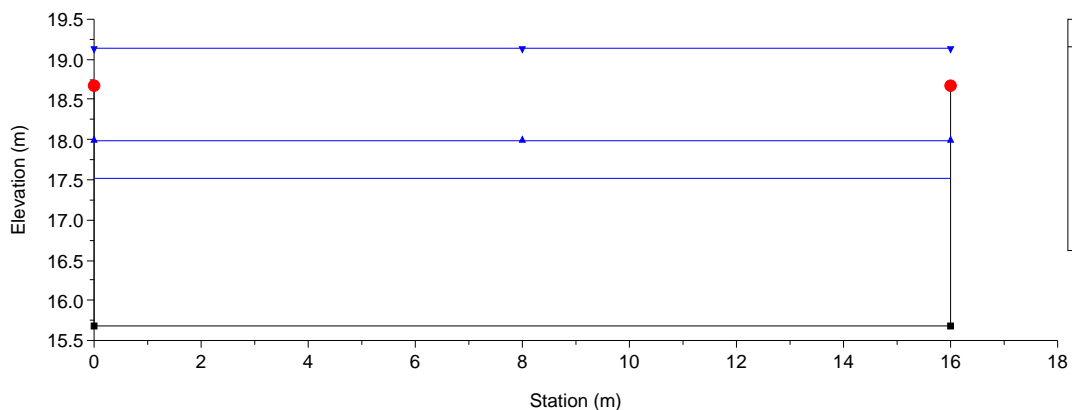
### RS = 44



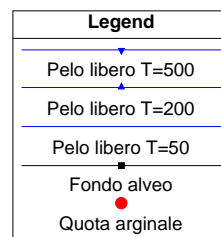
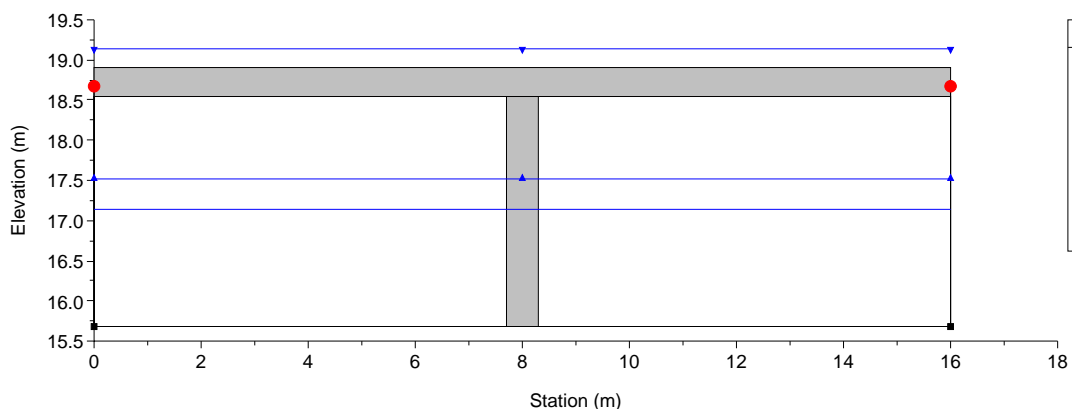
### RS = 43.



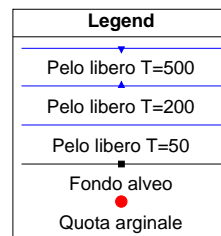
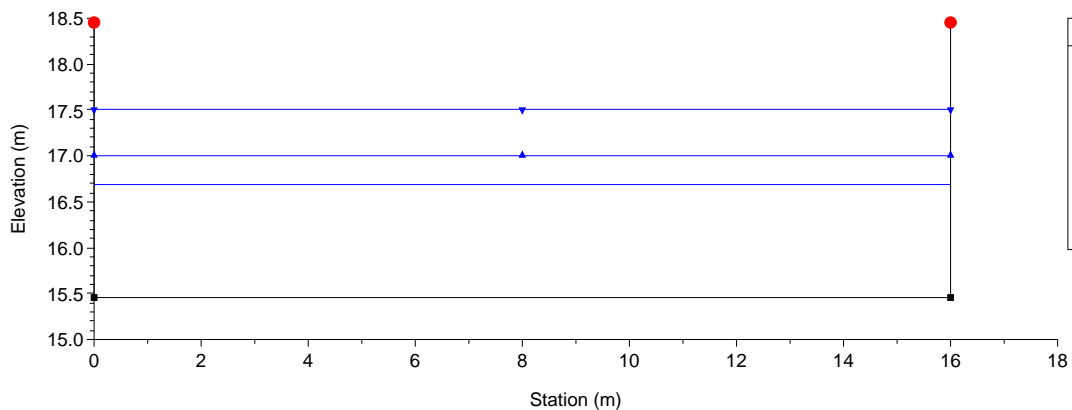
RS = 42.



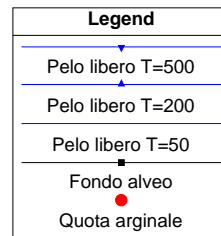
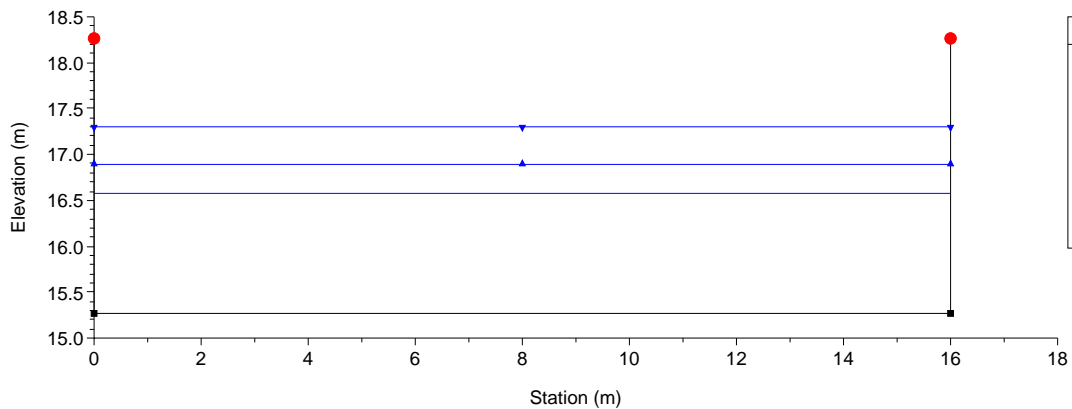
RS = 41.5 BR U



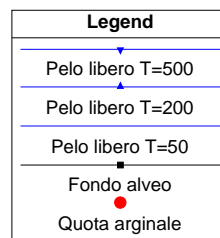
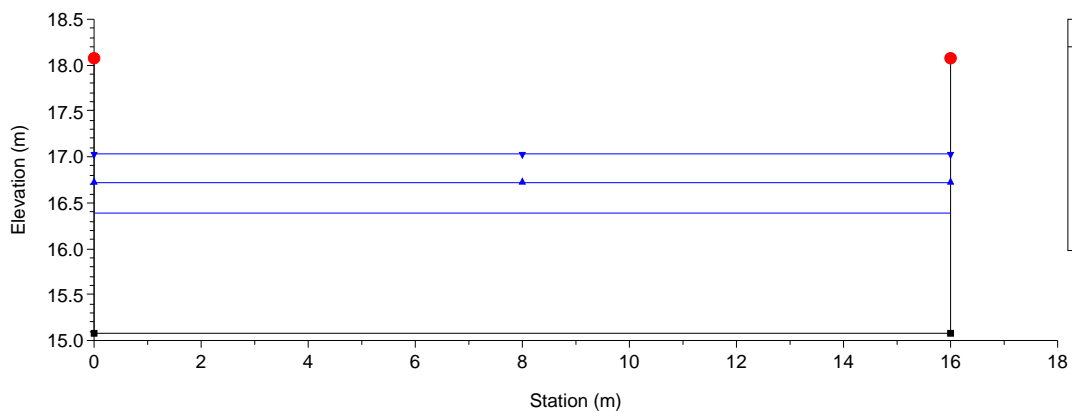
RS = 41.



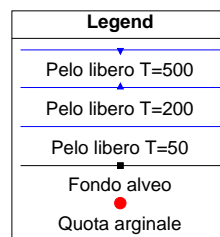
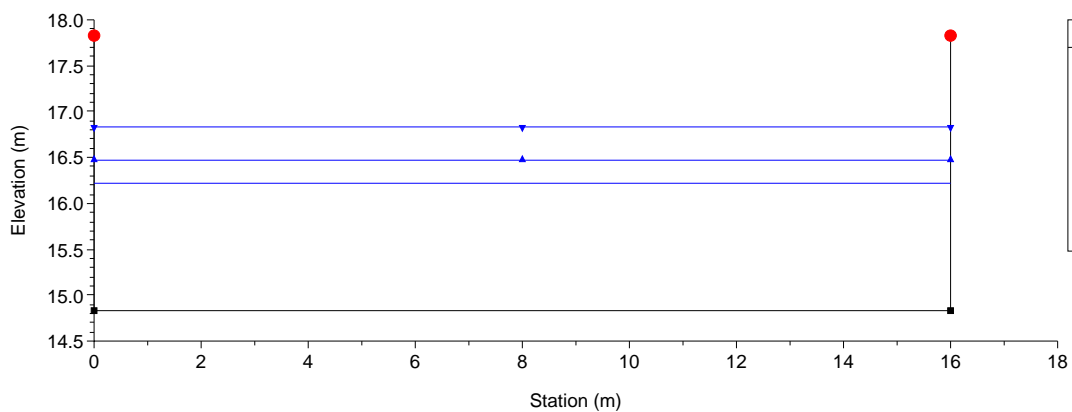
RS = 40.



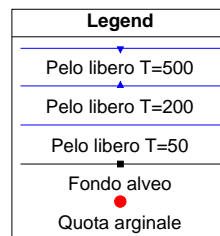
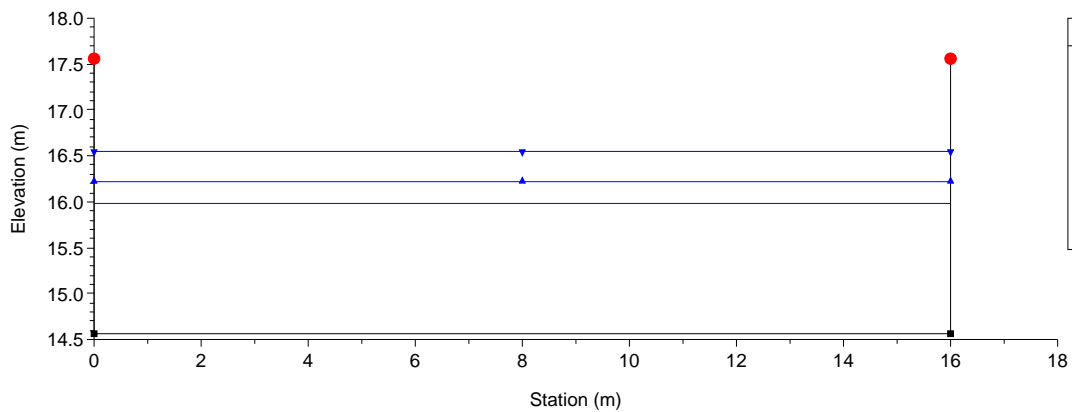
RS = 39.



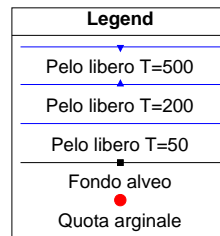
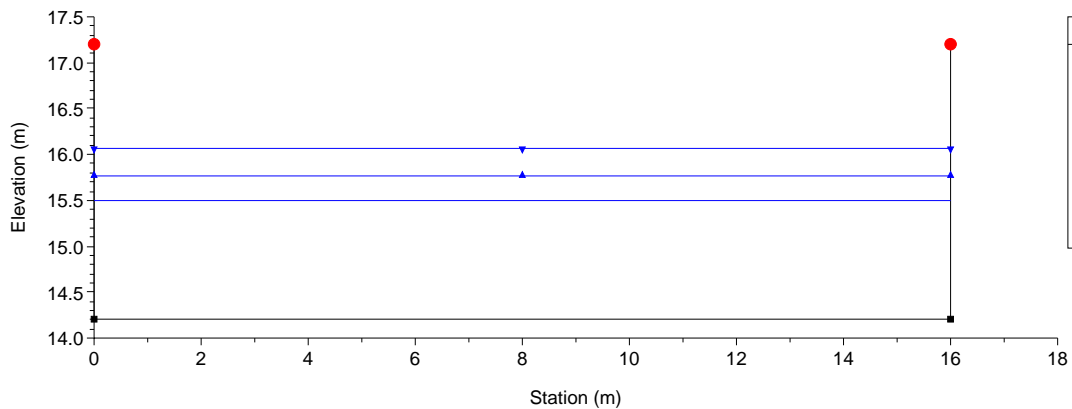
RS = 38.



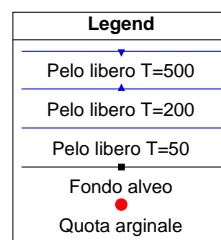
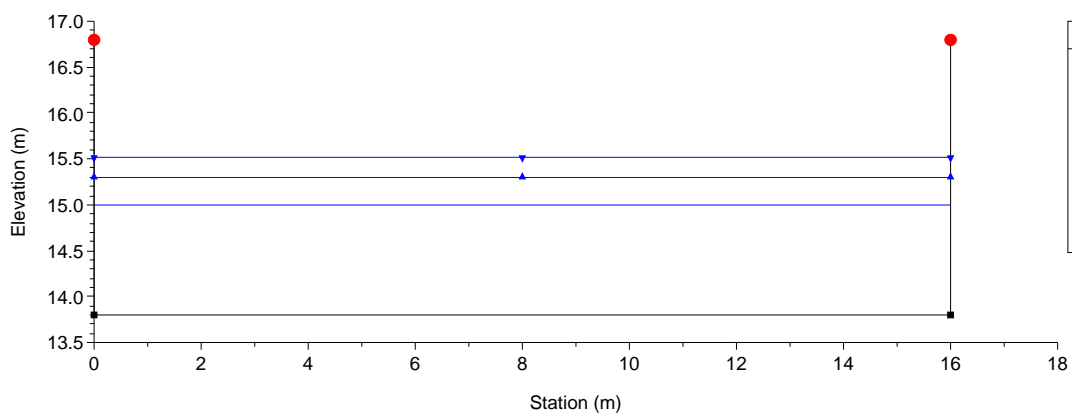
RS = 37.



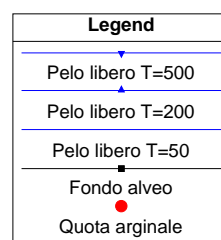
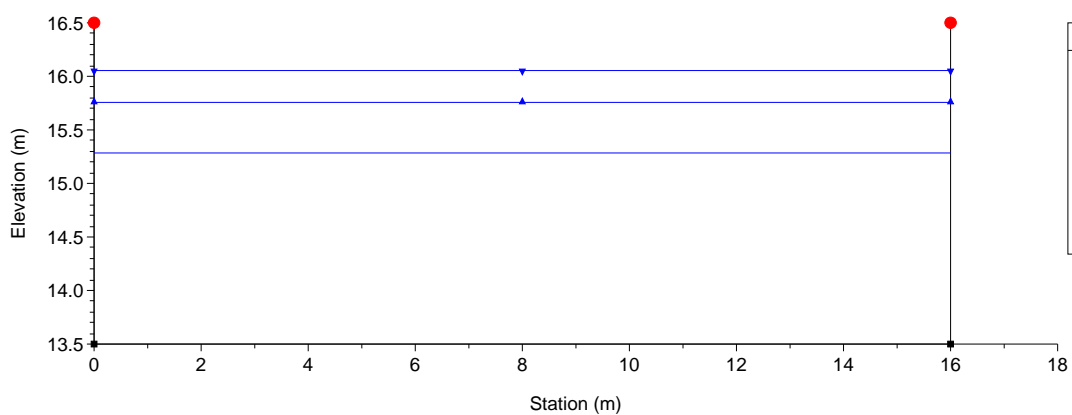
RS = 36.



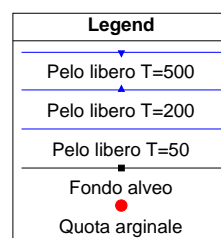
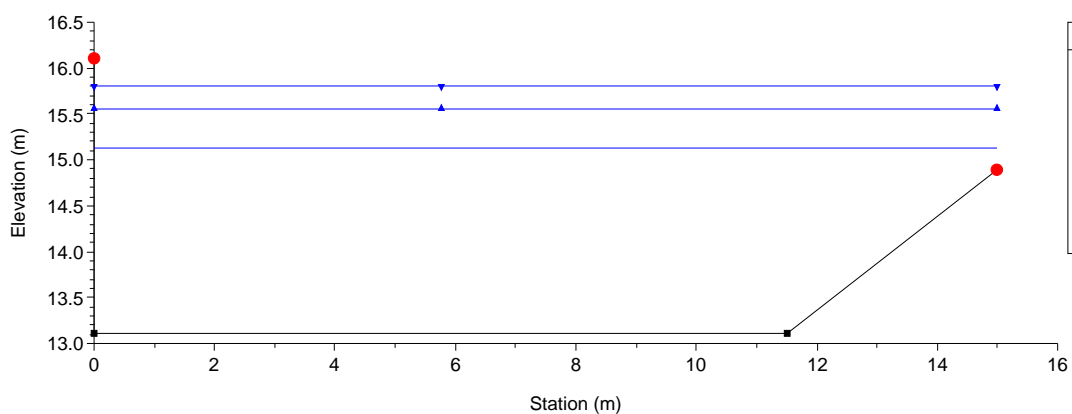
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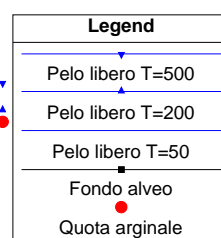
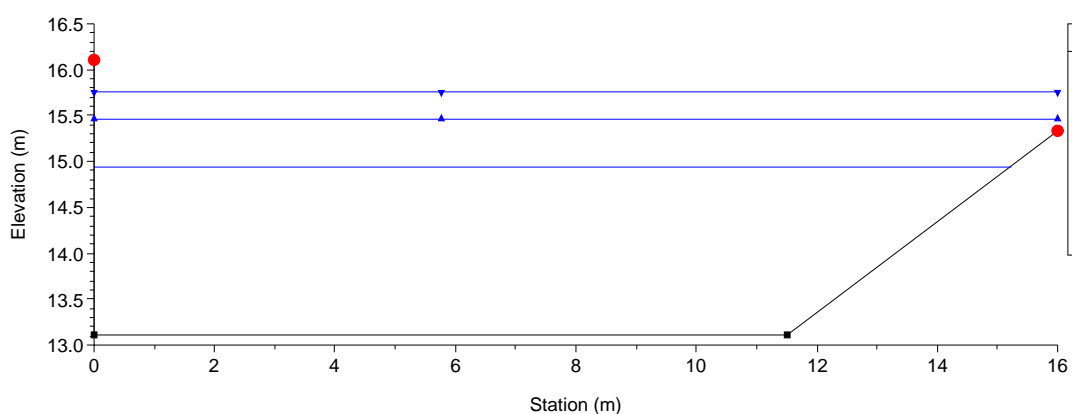
RS = 34.



RS = 33.

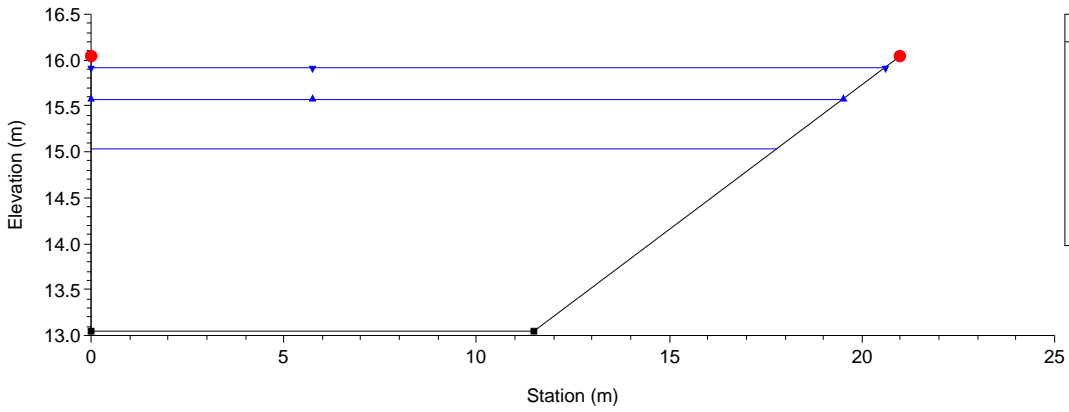


RS = 32.

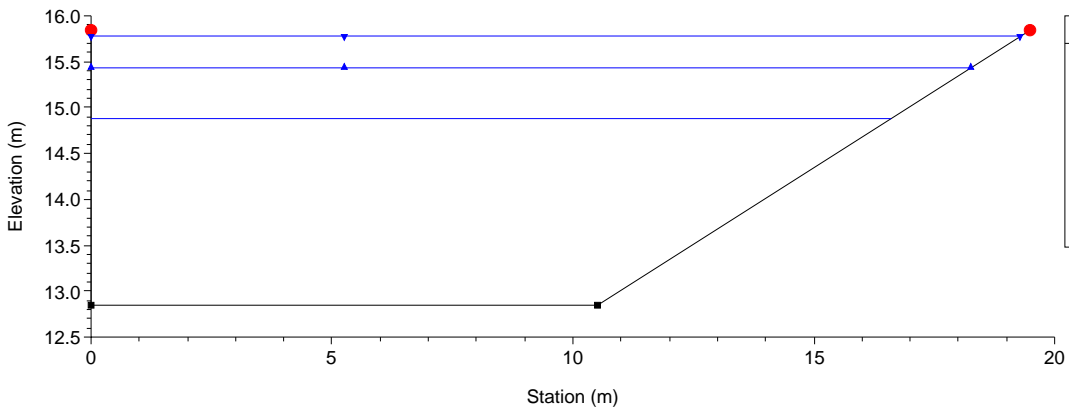




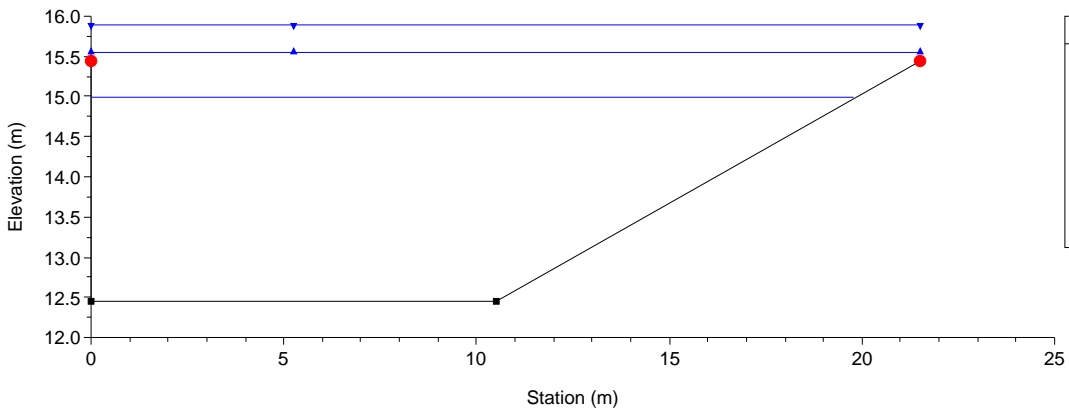
RS = 31.



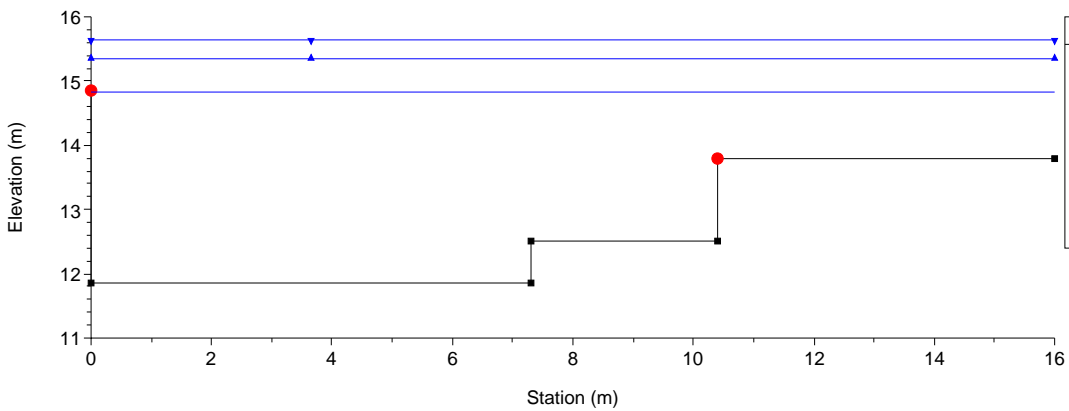
RS = 30.



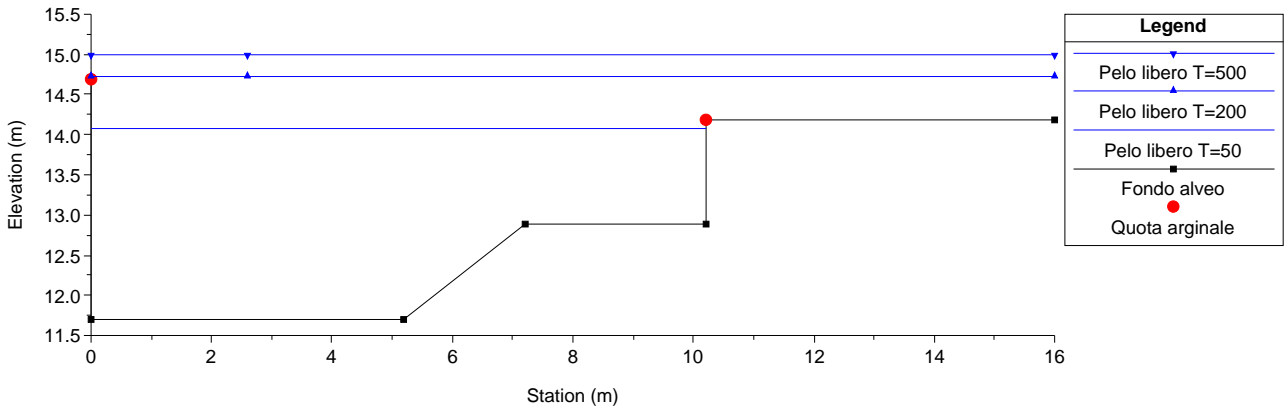
RS = 29.



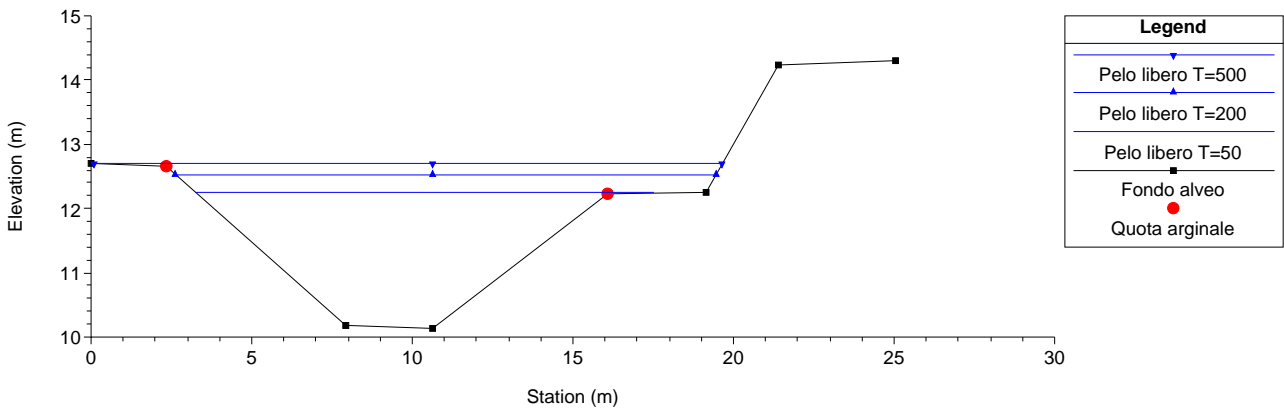
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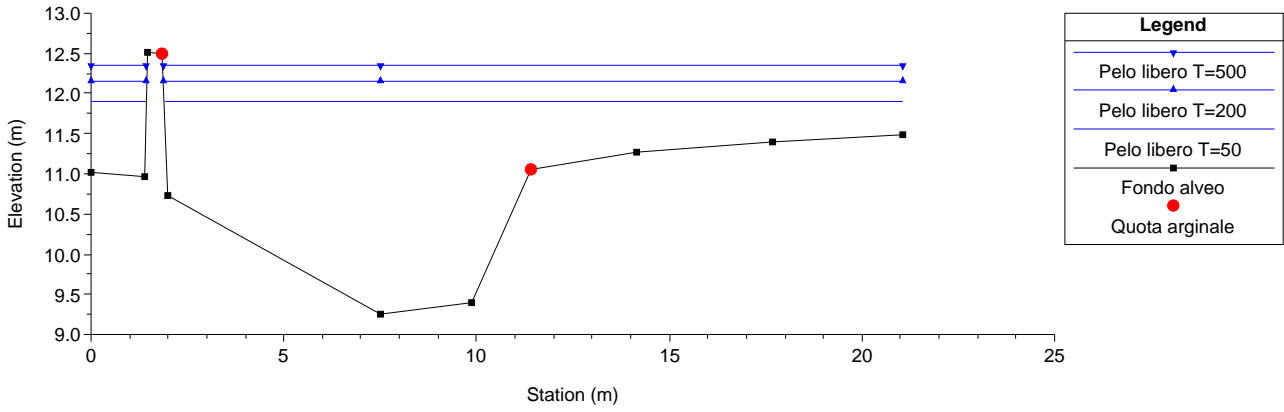
RS = 27.



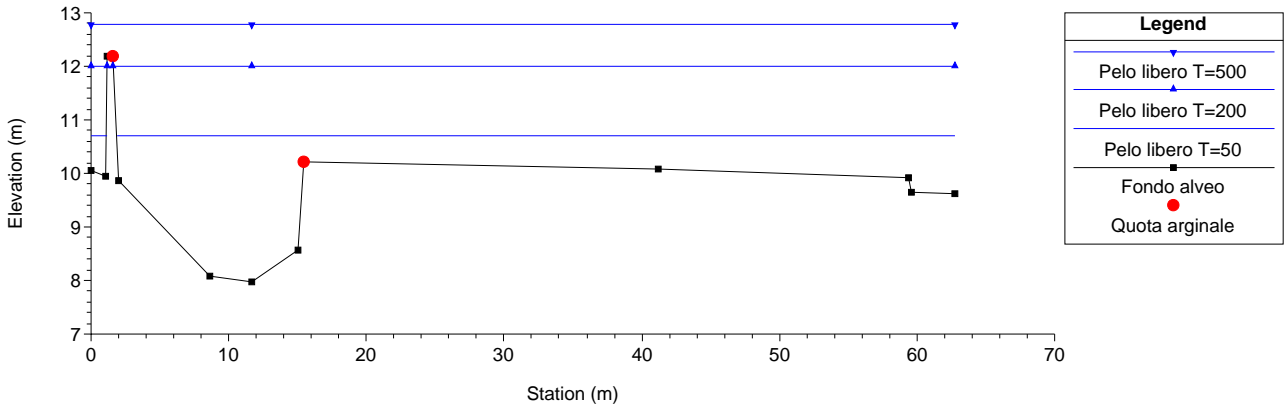
RS = 26



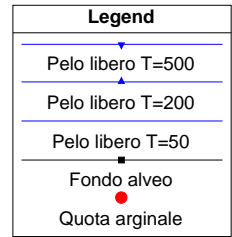
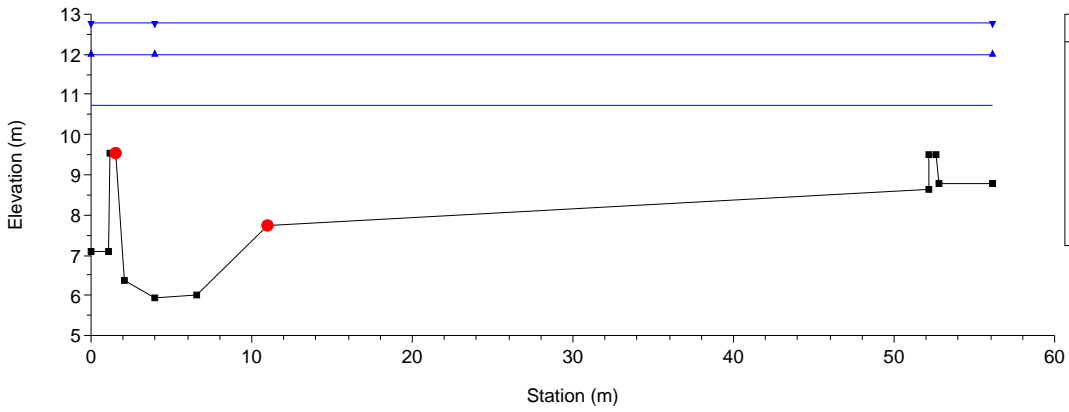
RS = 25



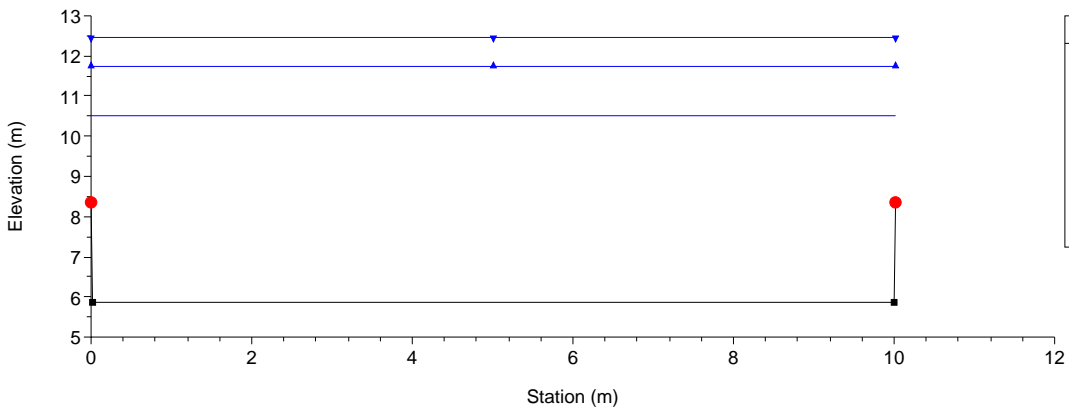
RS = 24



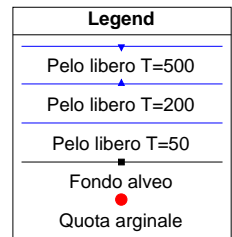
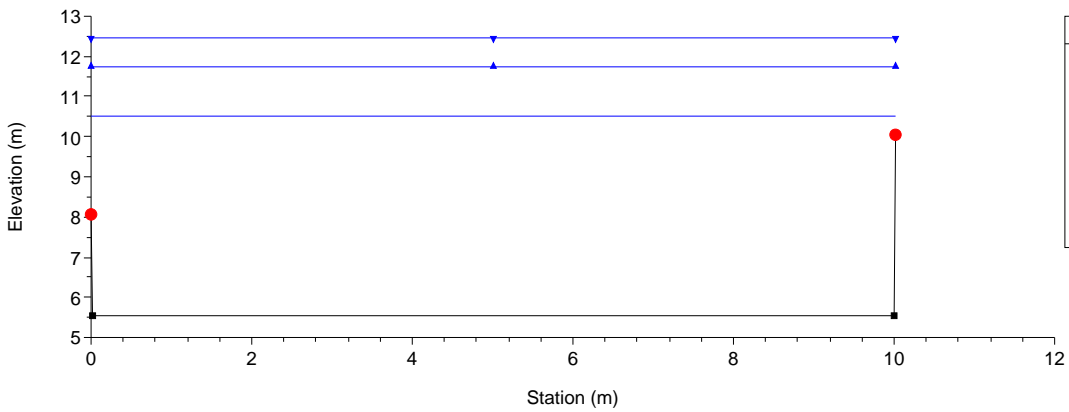
RS = 23



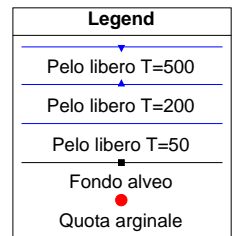
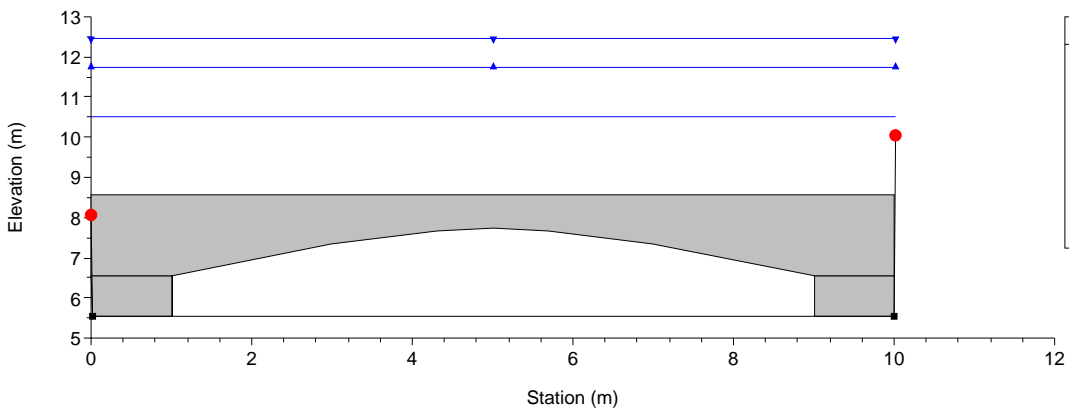
RS = 22



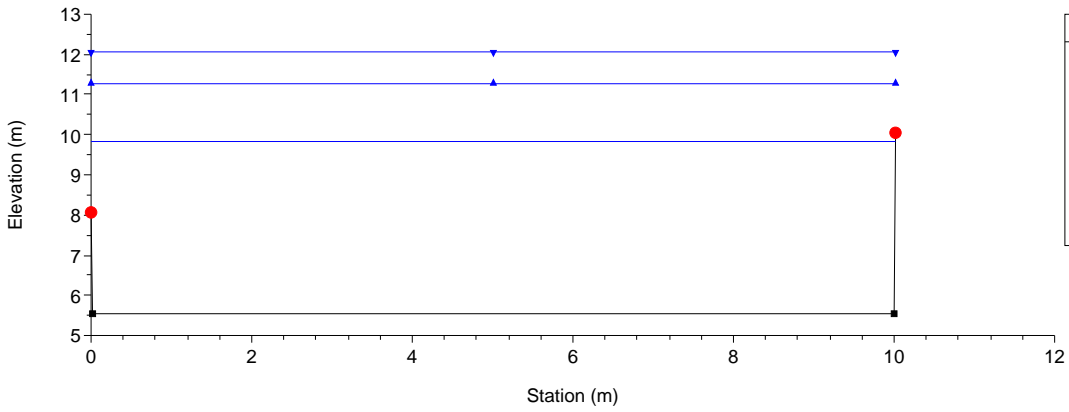
RS = 21



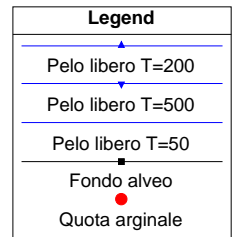
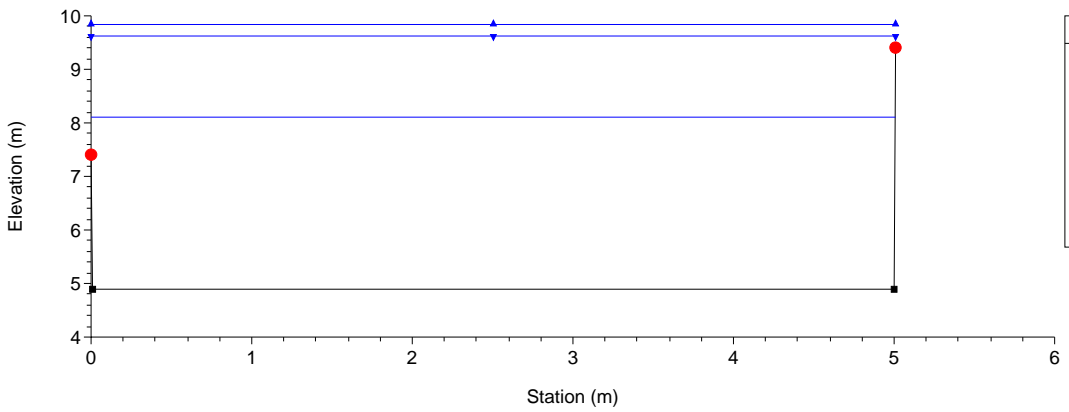
RS = 20.5 BR U



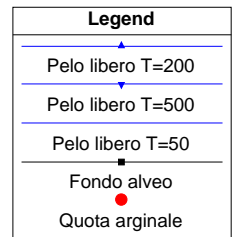
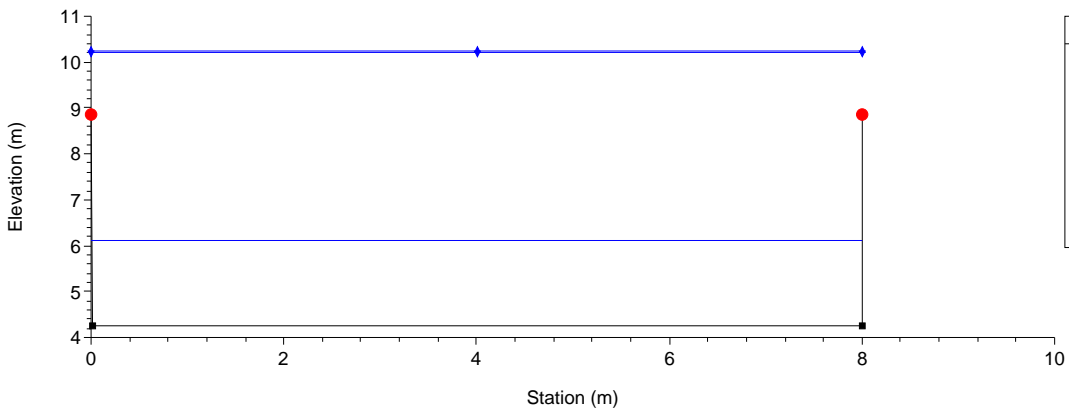
RS = 20



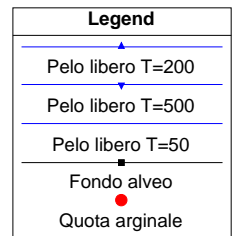
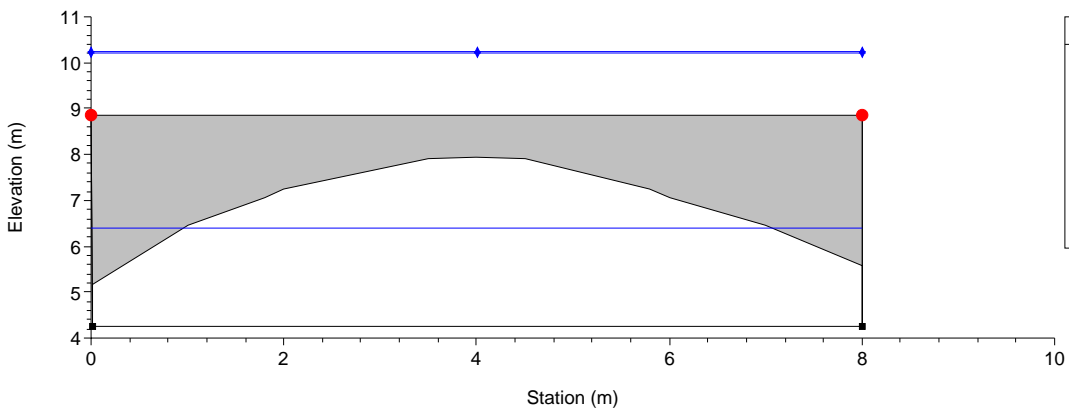
RS = 19



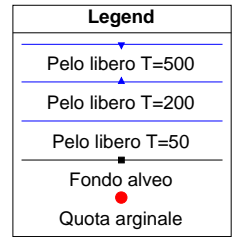
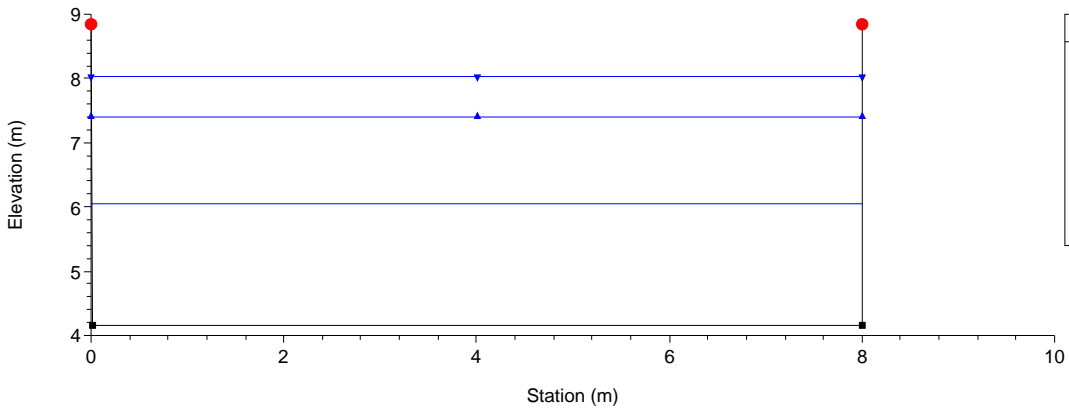
RS = 18



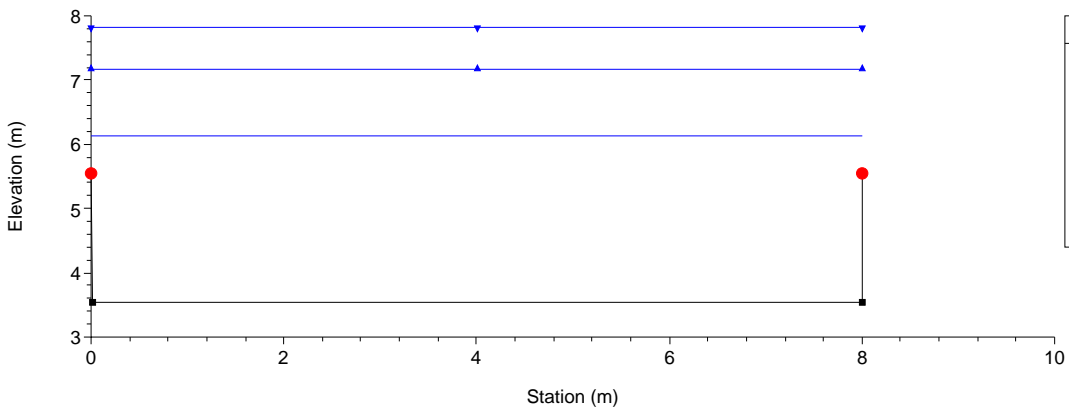
RS = 17.5 BR U



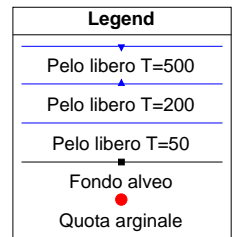
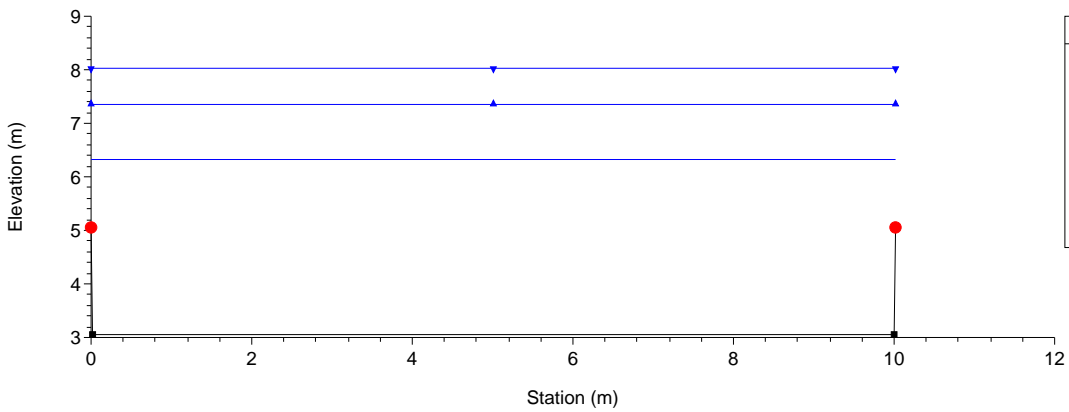
RS = 17



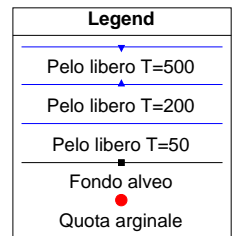
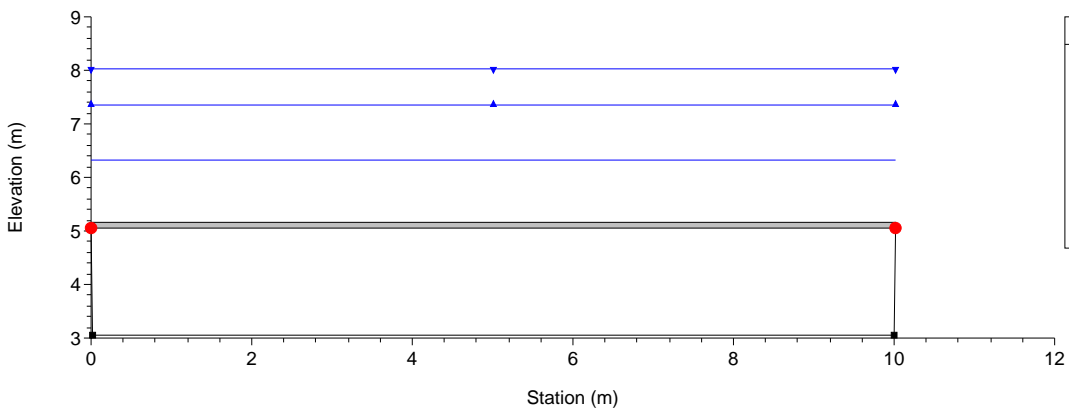
RS = 16



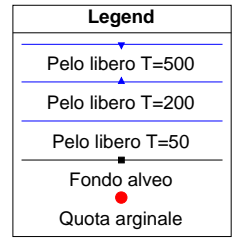
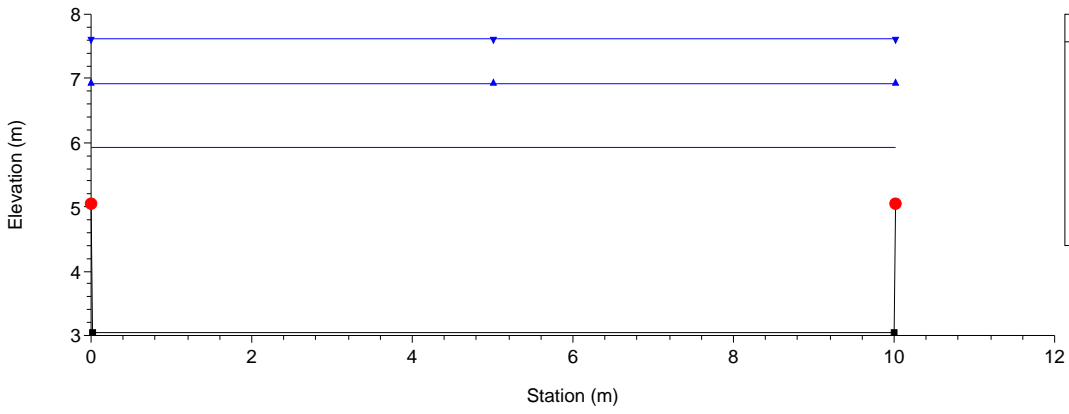
RS = 15



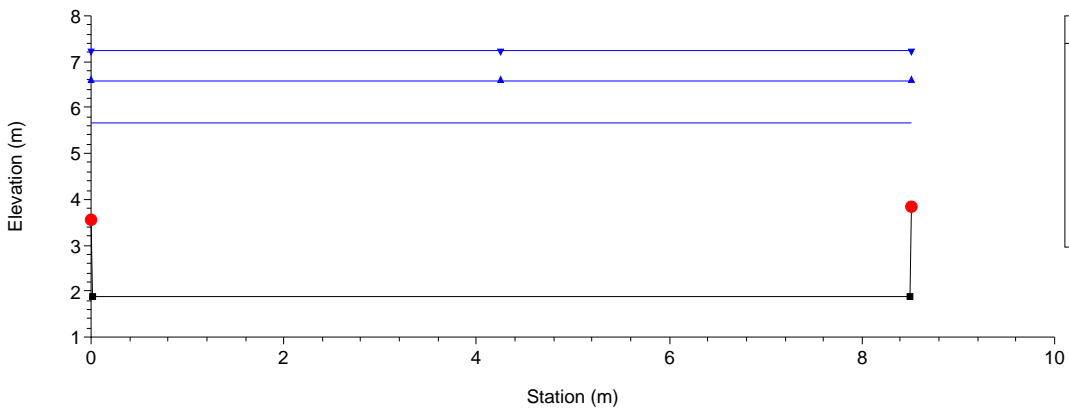
RS = 14.5 BR U



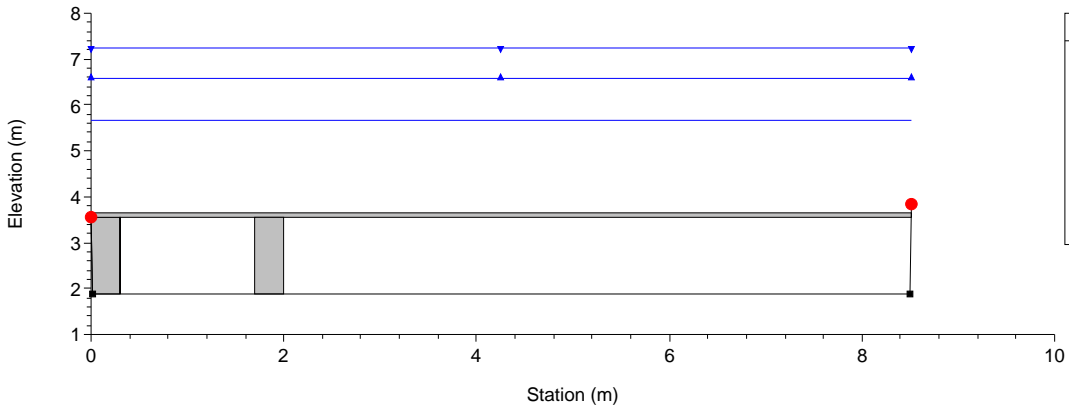
RS = 14



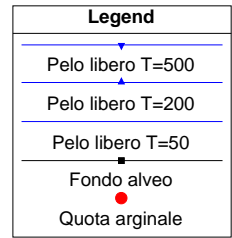
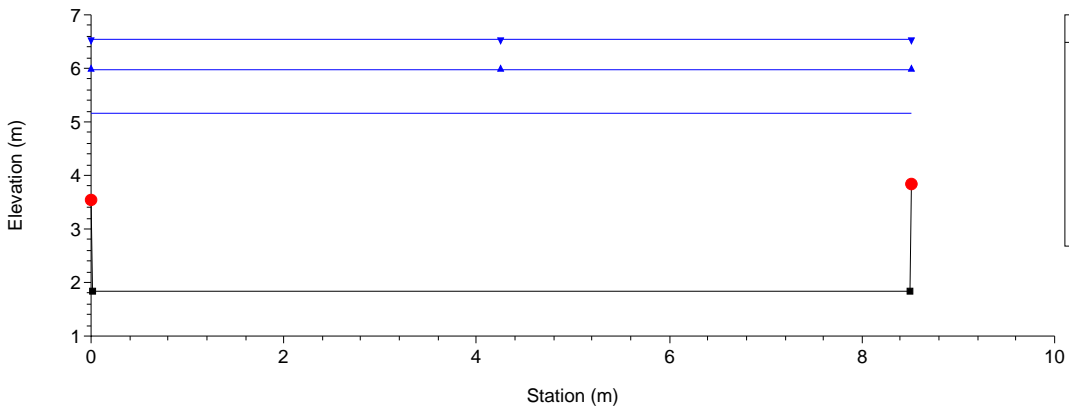
RS = 13



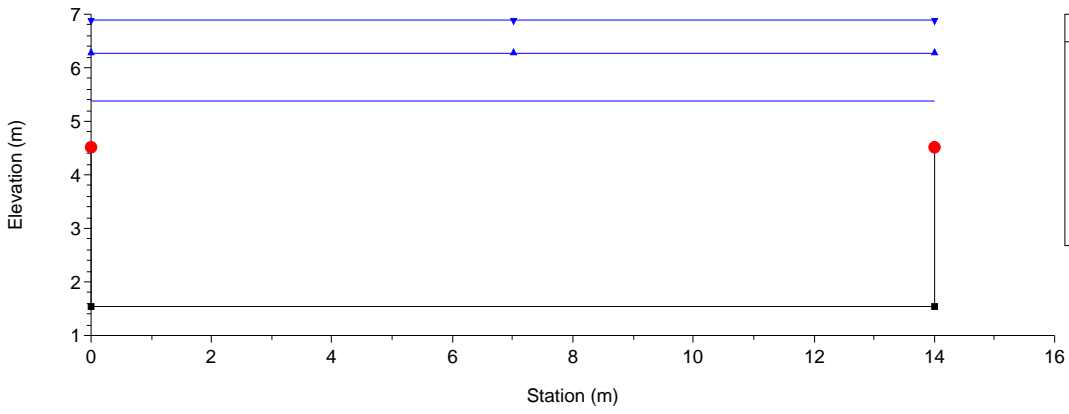
RS = 12.5 BR U



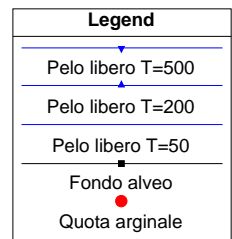
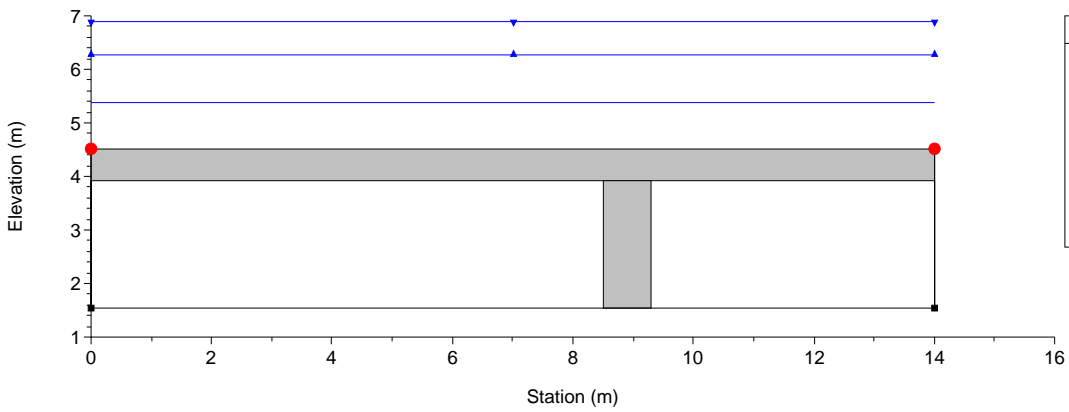
RS = 12



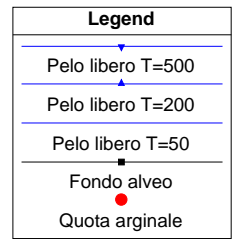
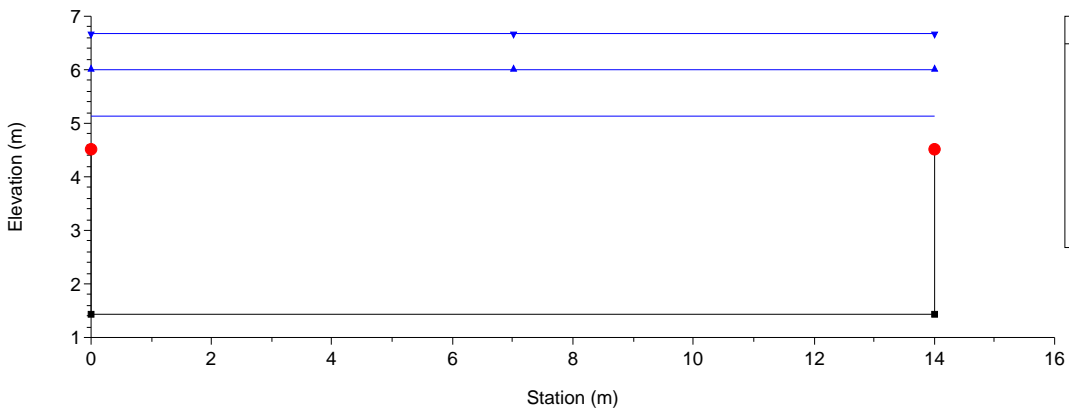
RS = 11



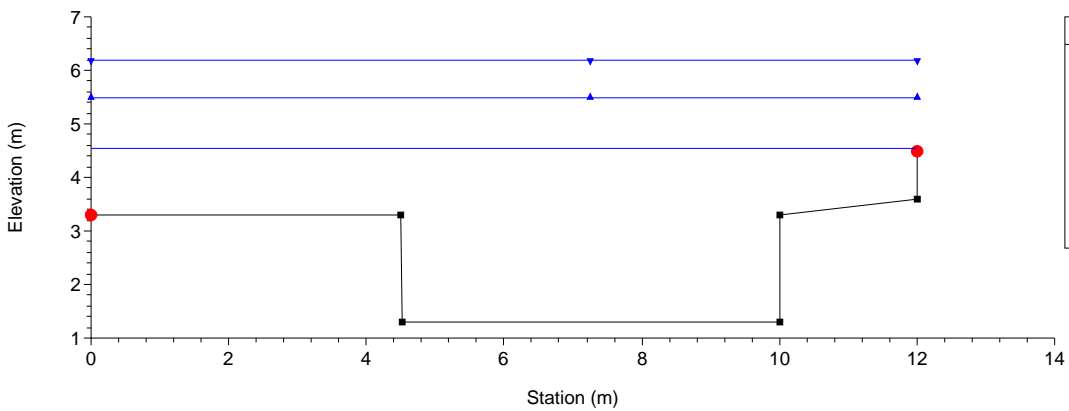
RS = 10.5 BR U



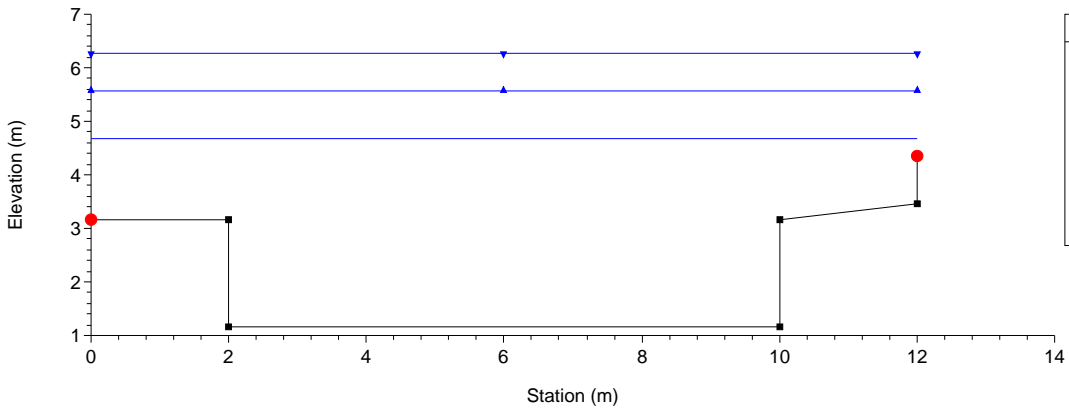
RS = 10



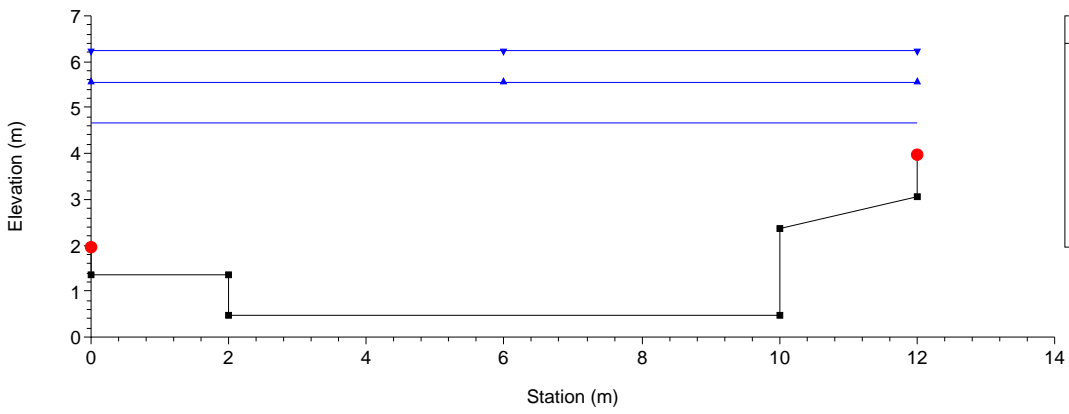
RS = 9



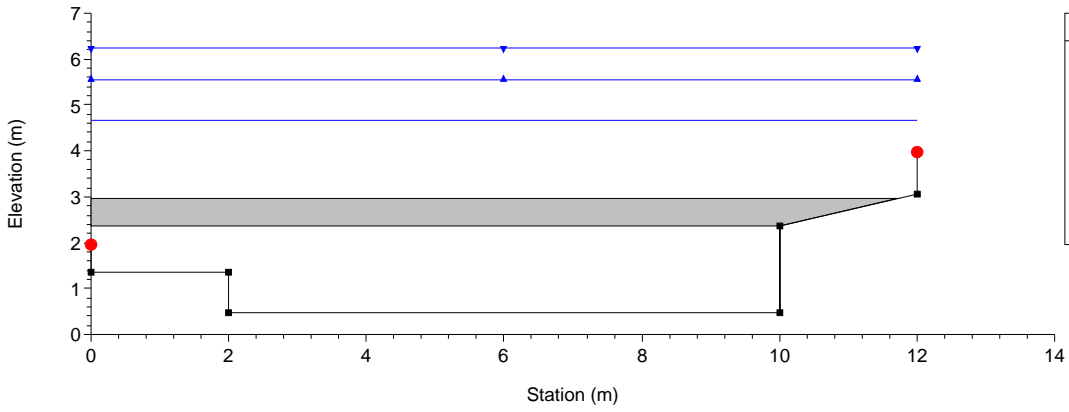
RS = 8



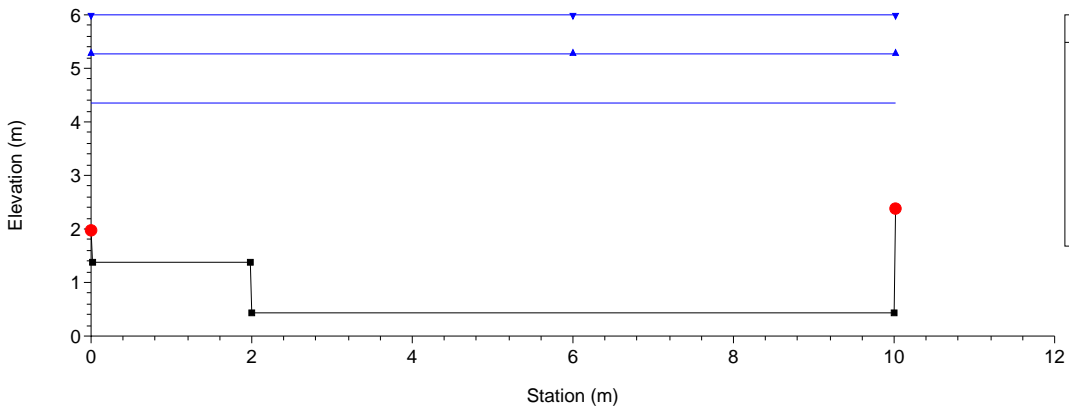
RS = 7



RS = 6.5 BR U

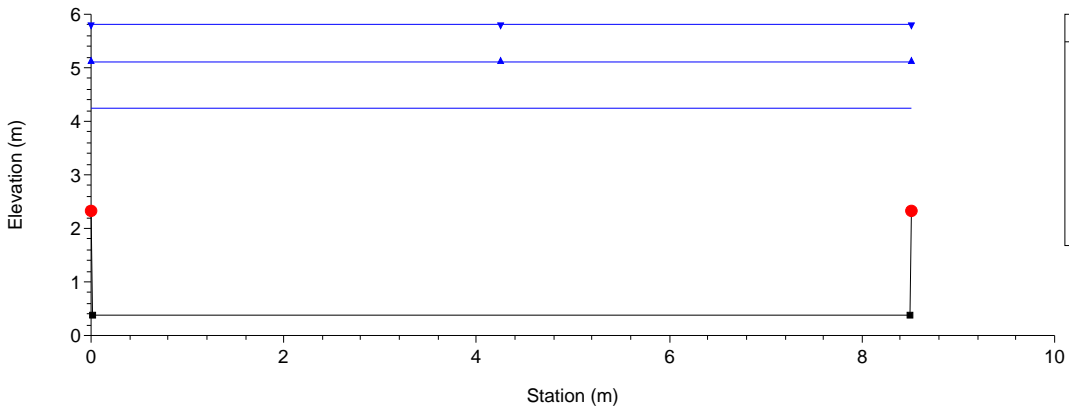


RS = 6



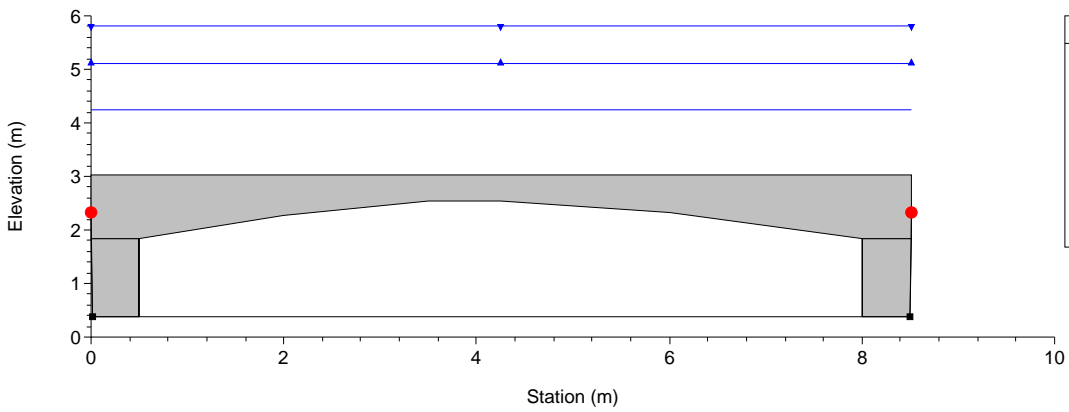


RS = 5



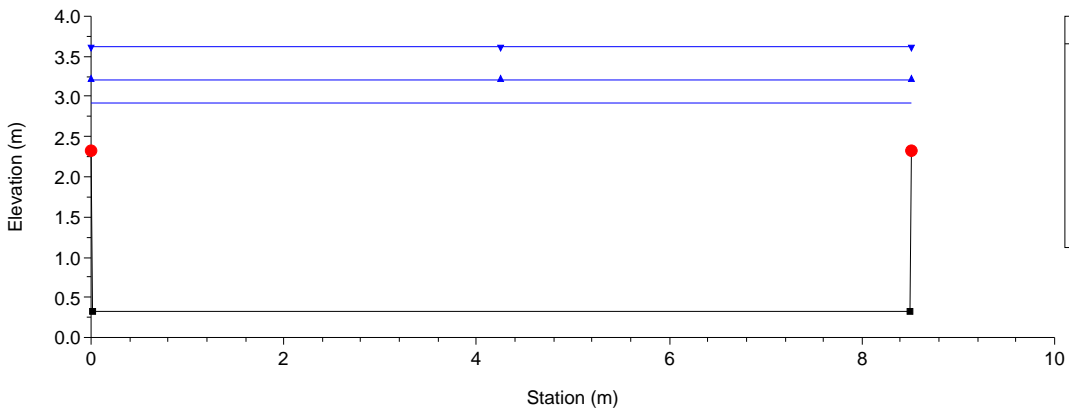
| Legend |                   |
|--------|-------------------|
|        | Pelo libero T=500 |
|        | Pelo libero T=200 |
|        | Pelo libero T=50  |
|        | Fondo alveo       |
|        | Quota arginale    |

RS = 4.5 BR U



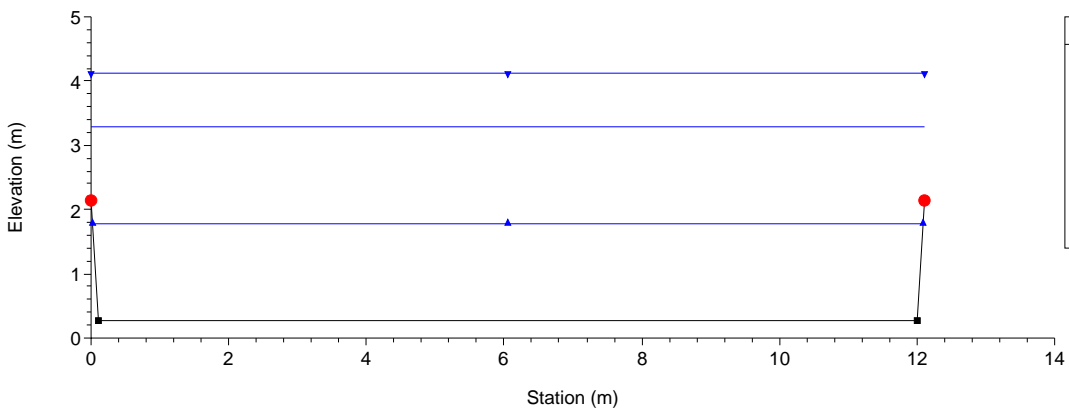
| Legend |                   |
|--------|-------------------|
|        | Pelo libero T=500 |
|        | Pelo libero T=200 |
|        | Pelo libero T=50  |
|        | Fondo alveo       |
|        | Quota arginale    |

RS = 4



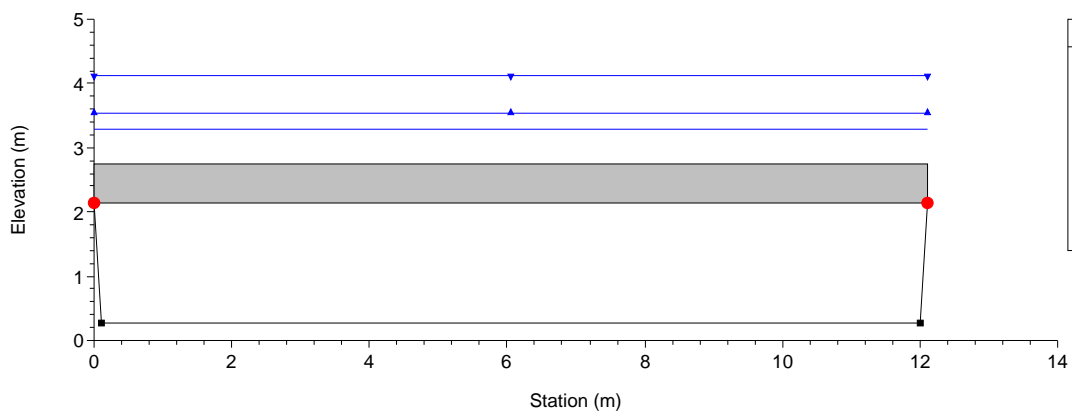
| Legend |                   |
|--------|-------------------|
|        | Pelo libero T=500 |
|        | Pelo libero T=200 |
|        | Pelo libero T=50  |
|        | Fondo alveo       |
|        | Quota arginale    |

RS = 3



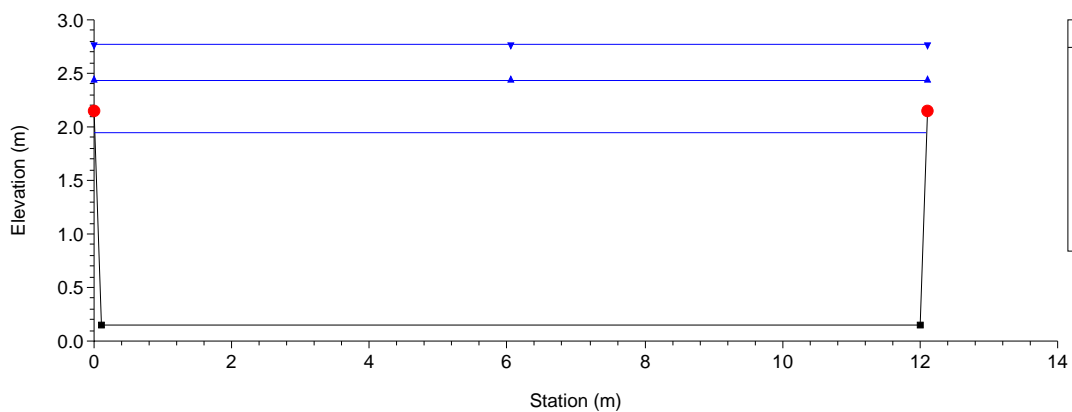
| Legend |                   |
|--------|-------------------|
|        | Pelo libero T=500 |
|        | Pelo libero T=50  |
|        | Pelo libero T=200 |
|        | Fondo alveo       |
|        | Quota arginale    |

RS = 2.5 BR U



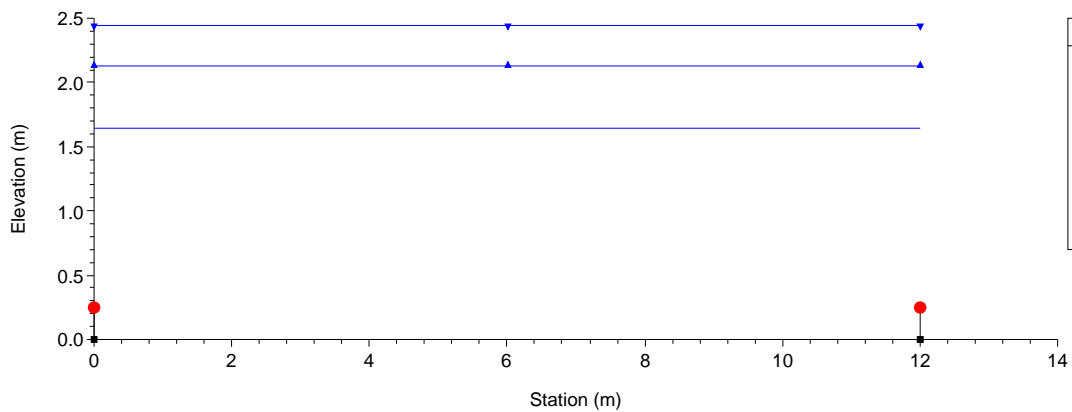
| Legend |                   |
|--------|-------------------|
|        | Pelo libero T=500 |
|        | Pelo libero T=200 |
|        | Pelo libero T=50  |
|        | Fondo alveo       |
|        | Quota arginale    |

RS = 2



| Legend |                   |
|--------|-------------------|
|        | Pelo libero T=500 |
|        | Pelo libero T=200 |
|        | Pelo libero T=50  |
|        | Fondo alveo       |
|        | Quota arginale    |

RS = 1



| Legend |                   |
|--------|-------------------|
|        | Pelo libero T=500 |
|        | Pelo libero T=200 |
|        | Pelo libero T=50  |
|        | Fondo alveo       |
|        | Quota arginale    |

**MODELLAZIONE IDRAULICA IN CONDIZIONI DI MOTO  
PERMANENTE:  
TABELLE DELLE GRANDEZZE IDRAULICHE SIGNIFICATIVE  
PER LE PORTATE T=50, 200, 500 ANNI**

**T. BOTTASSANO**



|      |        |      |      |      |      |      |      |      |       |      |
|------|--------|------|------|------|------|------|------|------|-------|------|
| 17   | 90     | 4.15 | 8.85 | 8.85 | 6.06 | 2.34 | 7.83 | 5.9  | 15.26 | 1.36 |
| 16   | 90     | 3.55 | 5.55 | 5.55 | 6.13 | 2.34 | 7.1  | 4.36 | 20.65 | 0.87 |
| 15   | 90     | 3.05 | 5.05 | 5.05 | 6.32 | 2.02 | 6.7  | 2.76 | 32.67 | 0.49 |
| 14.5 | Bridge |      |      |      |      |      |      |      |       |      |
| 14   | 90     | 3.05 | 5.05 | 5.05 | 5.93 | 2.02 | 6.43 | 3.13 | 28.79 | 0.59 |
| 13   | 90     | 1.88 | 3.55 | 3.85 | 5.65 | 2.25 | 6.06 | 2.8  | 32.1  | 0.46 |
| 12.5 | Bridge |      |      |      |      |      |      |      |       |      |
| 12   | 90     | 1.85 | 3.55 | 3.85 | 5.15 | 2.25 | 5.68 | 3.2  | 28.1  | 0.56 |
| 11   | 90     | 1.55 | 4.52 | 4.52 | 5.38 | 1.61 | 5.52 | 1.68 | 53.56 | 0.27 |
| 10.5 | Bridge |      |      |      |      |      |      |      |       |      |
| 10   | 90     | 1.42 | 4.52 | 4.52 | 5.12 | 1.61 | 5.28 | 1.74 | 51.84 | 0.29 |
| 9    | 90     | 1.3  | 3.3  | 4.5  | 4.55 | 2.9  | 5.18 | 3.5  | 25.74 | 0.76 |
| 8    | 90     | 1.15 | 3.15 | 4.35 | 4.68 | 2.47 | 5.03 | 2.64 | 34.07 | 0.5  |
| 7    | 90     | 0.46 | 1.97 | 3.97 | 4.66 | 2.24 | 4.88 | 2.04 | 44.13 | 0.34 |
| 6.5  | Bridge |      |      |      |      |      |      |      |       |      |
| 6    | 90     | 0.42 | 1.97 | 2.37 | 4.35 | 2.21 | 4.64 | 2.4  | 37.43 | 0.4  |
| 5    | 90     | 0.39 | 2.33 | 2.33 | 4.24 | 2.25 | 4.63 | 2.75 | 32.78 | 0.45 |
| 4.5  | Bridge |      |      |      |      |      |      |      |       |      |
| 4    | 90     | 0.33 | 2.33 | 2.33 | 2.92 | 2.24 | 3.77 | 4.09 | 22    | 0.81 |
| 3    | 90     | 0.28 | 2.15 | 2.15 | 3.28 | 1.79 | 3.6  | 2.49 | 36.13 | 0.46 |
| 2.5  | Bridge |      |      |      |      |      |      |      |       |      |
| 2    | 90     | 0.15 | 2.15 | 2.15 | 1.94 | 1.79 | 2.84 | 4.19 | 21.47 | 1    |
| 1    | 90     | 0    | 0.25 | 0.25 | 1.64 | 1.79 | 2.7  | 4.57 | 19.68 | 1.14 |



|      |        |      |      |      |      |      |      |      |       |      |
|------|--------|------|------|------|------|------|------|------|-------|------|
| 17   | 130    | 4.15 | 8.85 | 8.85 | 7.4  | 2.99 | 8.67 | 5.01 | 25.95 | 0.89 |
| 16   | 130    | 3.55 | 5.55 | 5.55 | 7.16 | 2.99 | 8.19 | 4.5  | 28.89 | 0.76 |
| 15   | 130    | 3.05 | 5.05 | 5.05 | 7.36 | 2.58 | 7.82 | 3.01 | 43.13 | 0.46 |
| 14.5 | Bridge |      |      |      |      |      |      |      |       |      |
| 14   | 130    | 3.05 | 5.05 | 5.05 | 6.92 | 2.57 | 7.5  | 3.36 | 38.74 | 0.54 |
| 13   | 130    | 1.88 | 3.55 | 3.85 | 6.6  | 2.88 | 7.13 | 3.24 | 40.11 | 0.48 |
| 12.5 | Bridge |      |      |      |      |      |      |      |       |      |
| 12   | 130    | 1.85 | 3.55 | 3.85 | 5.97 | 2.87 | 6.67 | 3.71 | 35.03 | 0.58 |
| 11   | 130    | 1.55 | 4.52 | 4.52 | 6.27 | 2.06 | 6.47 | 1.97 | 66.12 | 0.29 |
| 10.5 | Bridge |      |      |      |      |      |      |      |       |      |
| 10   | 130    | 1.42 | 4.52 | 4.52 | 6    | 2.06 | 6.21 | 2.03 | 64.14 | 0.3  |
| 9    | 130    | 1.3  | 3.3  | 4.5  | 5.48 | 3.4  | 6.12 | 3.52 | 36.94 | 0.64 |
| 8    | 130    | 1.15 | 3.15 | 4.35 | 5.58 | 2.96 | 6    | 2.9  | 44.86 | 0.48 |
| 7    | 130    | 0.46 | 1.97 | 3.97 | 5.56 | 2.8  | 5.84 | 2.37 | 54.86 | 0.35 |
| 6.5  | Bridge |      |      |      |      |      |      |      |       |      |
| 6    | 130    | 0.42 | 1.97 | 2.37 | 5.28 | 2.77 | 5.67 | 2.78 | 46.72 | 0.41 |
| 5    | 130    | 0.39 | 2.33 | 2.33 | 5.12 | 2.87 | 5.65 | 3.23 | 40.2  | 0.47 |
| 4.5  | Bridge |      |      |      |      |      |      |      |       |      |
| 4    | 130    | 0.33 | 2.33 | 2.33 | 3.2  | 2.87 | 4.65 | 5.32 | 24.42 | 1    |
| 3    | 130    | 0.28 | 2.15 | 2.15 | 1.78 | 2.28 | 4.45 | 7.25 | 17.94 | 1.9  |
| 2.5  | Bridge |      |      |      |      |      |      |      |       |      |
| 2    | 130    | 0.15 | 2.15 | 2.15 | 2.43 | 2.29 | 3.58 | 4.74 | 27.41 | 1.01 |
| 1    | 130    | 0    | 0.25 | 0.25 | 2.13 | 2.28 | 3.45 | 5.08 | 25.58 | 1.11 |

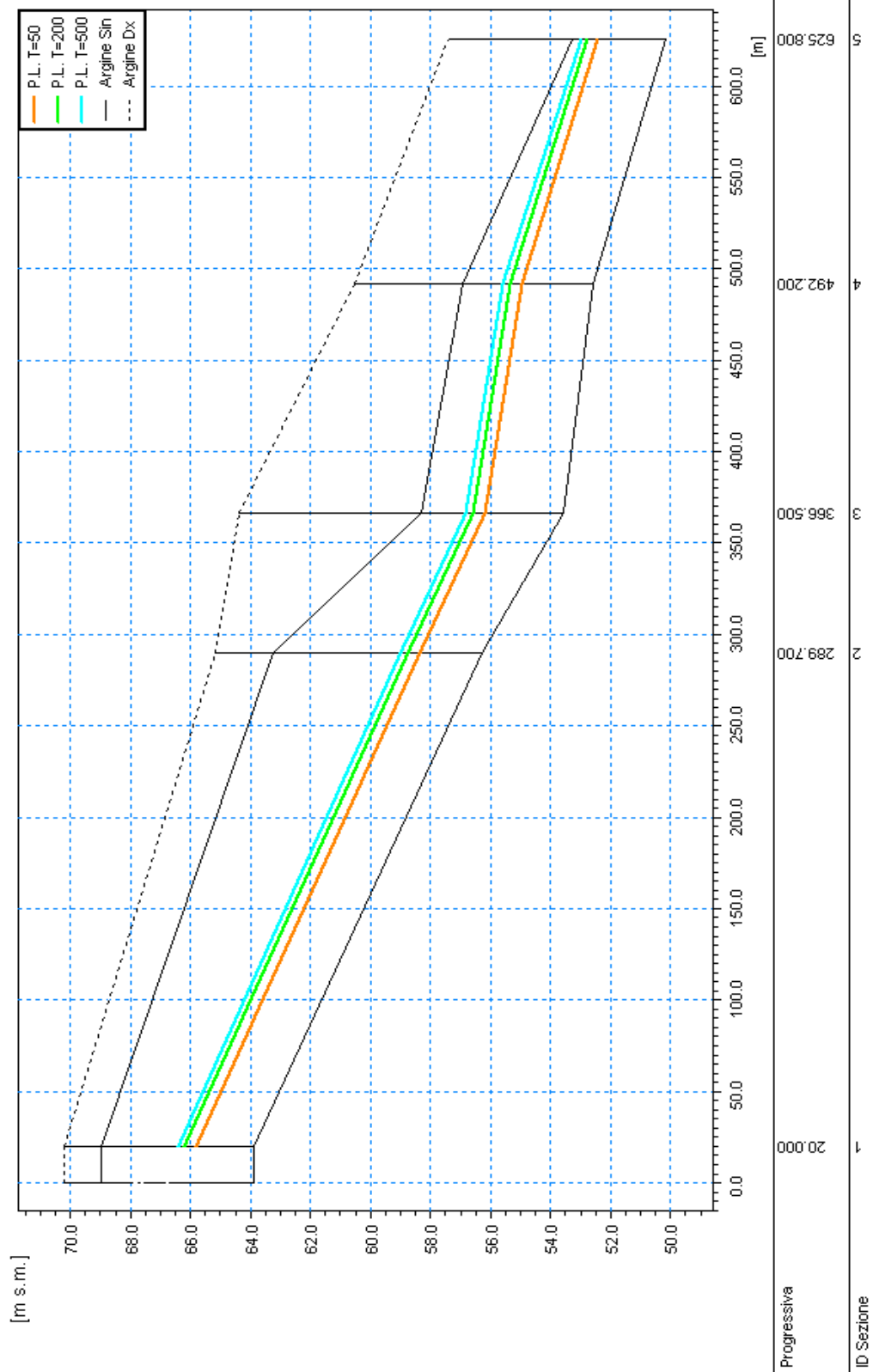




|      |        |      |      |      |      |      |      |      |       |      |
|------|--------|------|------|------|------|------|------|------|-------|------|
| 17   | 160    | 4.15 | 8.85 | 8.85 | 8.04 | 3.43 | 9.39 | 5.14 | 31.14 | 0.83 |
| 16   | 160    | 3.55 | 5.55 | 5.55 | 7.82 | 3.43 | 8.93 | 4.68 | 34.16 | 0.72 |
| 15   | 160    | 3.05 | 5.05 | 5.05 | 8.04 | 2.97 | 8.56 | 3.21 | 49.9  | 0.46 |
| 14.5 | Bridge |      |      |      |      |      |      |      |       |      |
| 14   | 160    | 3.05 | 5.05 | 5.05 | 7.61 | 2.95 | 8.24 | 3.51 | 45.64 | 0.52 |
| 13   | 160    | 1.88 | 3.55 | 3.85 | 7.24 | 3.3  | 7.87 | 3.51 | 45.6  | 0.48 |
| 12.5 | Bridge |      |      |      |      |      |      |      |       |      |
| 12   | 160    | 1.85 | 3.55 | 3.85 | 6.55 | 3.31 | 7.37 | 4    | 39.97 | 0.59 |
| 11   | 160    | 1.55 | 4.52 | 4.52 | 6.9  | 2.36 | 7.14 | 2.13 | 74.98 | 0.29 |
| 10.5 | Bridge |      |      |      |      |      |      |      |       |      |
| 10   | 160    | 1.42 | 4.52 | 4.52 | 6.67 | 2.36 | 6.91 | 2.18 | 73.53 | 0.3  |
| 9    | 160    | 1.3  | 3.3  | 4.5  | 6.19 | 3.74 | 6.82 | 3.52 | 45.43 | 0.58 |
| 8    | 160    | 1.15 | 3.15 | 4.35 | 6.27 | 3.32 | 6.73 | 3.01 | 53.14 | 0.46 |
| 7    | 160    | 0.46 | 1.97 | 3.97 | 6.24 | 3.14 | 6.57 | 2.54 | 63.11 | 0.35 |
| 6.5  | Bridge |      |      |      |      |      |      |      |       |      |
| 6    | 160    | 0.42 | 1.97 | 2.37 | 6    | 3.16 | 6.45 | 2.97 | 53.92 | 0.41 |
| 5    | 160    | 0.39 | 2.33 | 2.33 | 5.8  | 3.31 | 6.42 | 3.47 | 46.06 | 0.48 |
| 4.5  | Bridge |      |      |      |      |      |      |      |       |      |
| 4    | 160    | 0.33 | 2.33 | 2.33 | 3.62 | 3.29 | 5.29 | 5.71 | 28.01 | 1.01 |
| 3    | 160    | 0.28 | 2.15 | 2.15 | 4.12 | 2.62 | 4.73 | 3.46 | 46.26 | 0.56 |
| 2.5  | Bridge |      |      |      |      |      |      |      |       |      |
| 2    | 160    | 0.15 | 2.15 | 2.15 | 2.77 | 2.62 | 4.08 | 5.08 | 31.5  | 1    |
| 1    | 160    | 0    | 0.25 | 0.25 | 2.45 | 2.63 | 3.96 | 5.45 | 29.37 | 1.11 |

PROFILI DI RIGURGITO IN CONDIZIONI DI MOTO  
PERMANENTE PER LE PORTATE T=50, 200, 500 ANNI

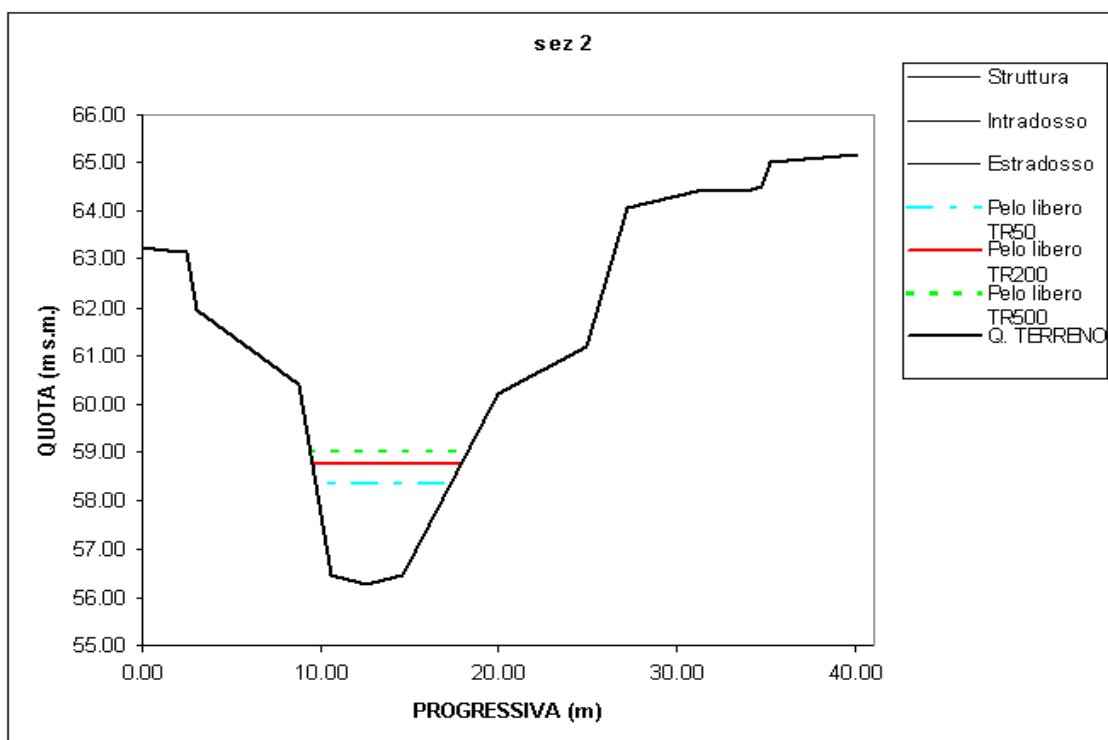
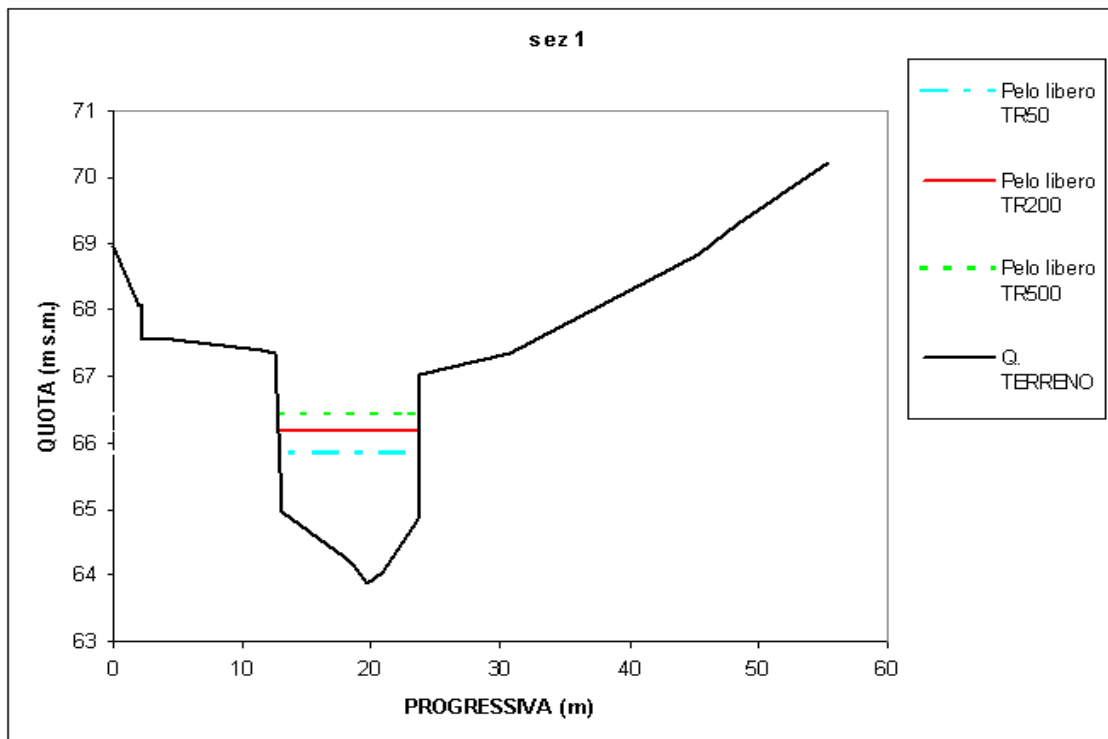
**T. BOTTASSANO a monte del viadotto autostradale**

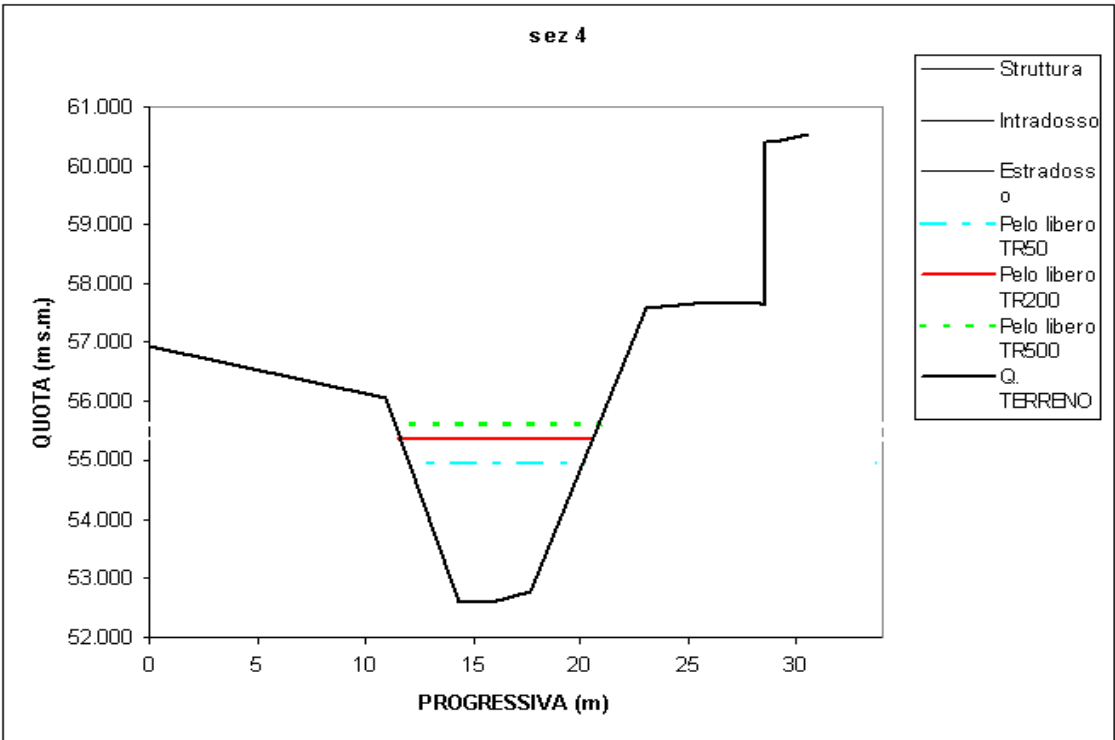
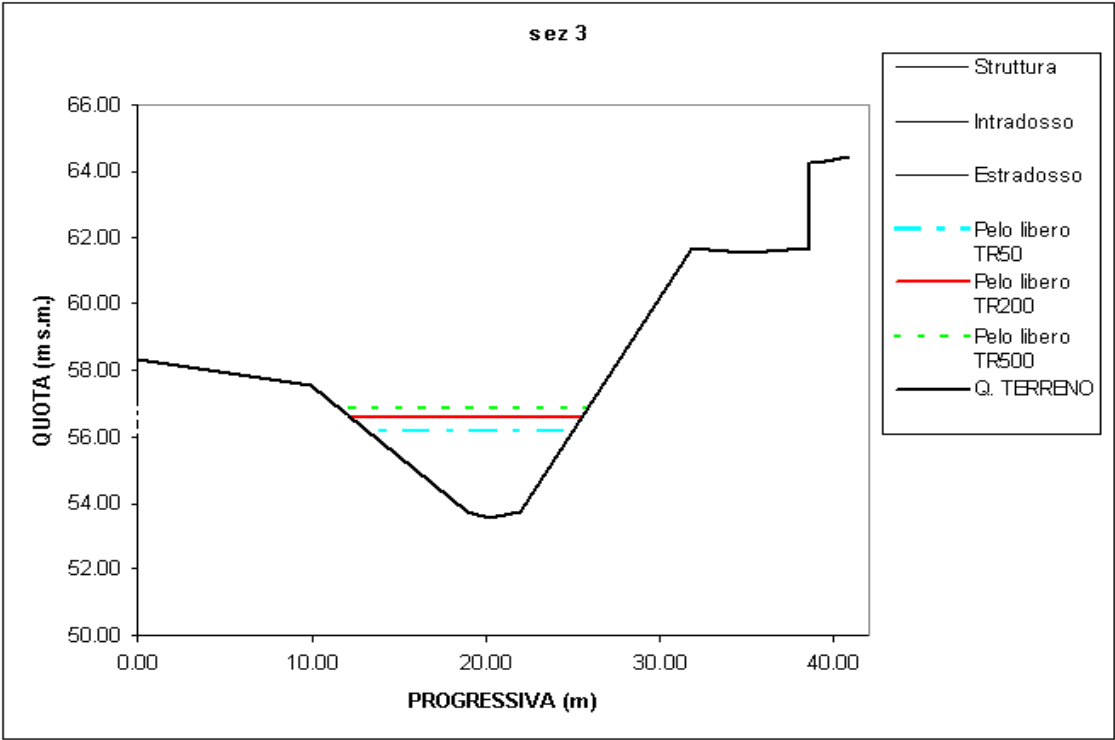


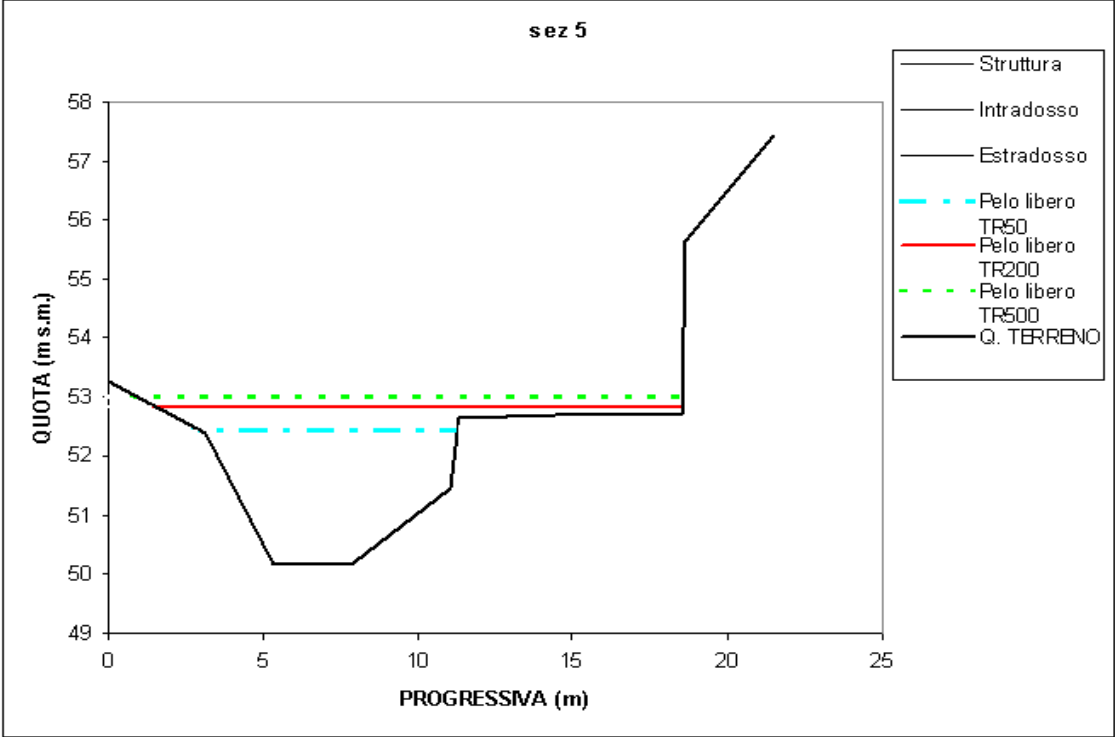
GEOMETRIA DELLE SEZIONI ED ALTEZZA DEL PELO  
LIBERO IN CONDIZIONI DI MOTO PERMANENTE  
PER LE PORTATE T=50, 200, 500 ANNI

**T. BOTTASSANO a monte del viadotto autostradale**

DALLA SEZ. 64  
ALLA SEZ. 1







MODELLAZIONE IDRAULICA IN CONDIZIONI DI MOTO  
PERMANENTE:  
TABELLE DELLE GRANDEZZE IDRAULICHE SIGNIFICATIVE  
PER LE PORTATE T=50, 200, 500 ANNI

**T. BOTTASSANO a monte del viadotto autostradale**



| TORRENTE BOTTASANO – PROFILO DI CORRENTE PER T=50 ANNI |            |                      |               |                     |       |         |        |
|--------------------------------------------------------|------------|----------------------|---------------|---------------------|-------|---------|--------|
| ID Sez.                                                | Progr. (m) | Quota fondo (m s.m.) | P.L. (m s.m.) | A (m <sup>2</sup> ) | b (m) | v (m/s) | Fr (-) |
| 1                                                      | 20.00      | 63.87                | 65.83         | 15.19               | 10.89 | 5.40    | 1.46   |
| 2                                                      | 289.70     | 56.26                | 58.36         | 11.53               | 7.65  | 7.37    | 1.92   |
| 3                                                      | 366.50     | 53.57                | 56.16         | 18.56               | 11.89 | 4.58    | 1.17   |
| 4                                                      | 492.20     | 52.59                | 54.95         | 13.32               | 8.12  | 6.38    | 1.59   |
| 5                                                      | 625.80     | 50.16                | 52.43         | 22.70               | 10.00 | 3.74    | 0.79   |

Torrente Bottasano - Risultati delle simulazioni idrauliche – T = 50 anni

| TORRENTE BOTTASANO – PROFILO DI CORRENTE PER T=200 ANNI |            |                      |               |                     |       |         |        |
|---------------------------------------------------------|------------|----------------------|---------------|---------------------|-------|---------|--------|
| ID Sez.                                                 | Progr. (m) | Quota fondo (m s.m.) | P.L. (m s.m.) | A (m <sup>2</sup> ) | b (m) | v (m/s) | Fr (-) |
| 1                                                       | 20.00      | 63.87                | 66.19         | 19.15               | 11.00 | 6.07    | 1.47   |
| 2                                                       | 289.70     | 56.26                | 58.75         | 14.80               | 8.39  | 8.11    | 1.95   |
| 3                                                       | 366.50     | 53.57                | 56.58         | 23.87               | 13.42 | 5.03    | 1.20   |
| 4                                                       | 492.20     | 52.59                | 55.37         | 16.85               | 9.00  | 6.92    | 1.61   |
| 5                                                       | 625.80     | 50.16                | 52.80         | 42.24               | 16.00 | 2.84    | 0.56   |

Torrente Bottasano -Risultati delle simulazioni idrauliche – T = 200 anni

| TORRENTE BOTTASANO – PROFILO DI CORRENTE PER T=500 ANNI |            |                      |               |                     |       |         |        |
|---------------------------------------------------------|------------|----------------------|---------------|---------------------|-------|---------|--------|
| ID Sez.                                                 | Progr. (m) | Quota fondo (m s.m.) | P.L. (m s.m.) | A (m <sup>2</sup> ) | b (m) | v (m/s) | Fr (-) |
| 1                                                       | 20.00      | 63.87                | 66.43         | 21.81               | 11.08 | 6.11    | 1.39   |
| 2                                                       | 289.70     | 56.26                | 58.99         | 16.88               | 8.87  | 8.59    | 1.99   |
| 3                                                       | 366.50     | 53.57                | 56.83         | 27.42               | 14.32 | 5.29    | 1.22   |
| 4                                                       | 492.20     | 52.59                | 55.61         | 19.19               | 9.51  | 7.16    | 1.61   |
| 5                                                       | 625.80     | 50.16                | 53.00         | 52.54               | 18.50 | 2.76    | 0.52   |

Torrente Bottasano -Risultati delle simulazioni idrauliche – T = 500 anni