

**. . . Fire Protection by Computer Design**

Residential Fire Protection  
64 Daggett Hill Rd.  
Greene, ME 04236  
(207)946-343

Job Name : ROSA TRUE APT- BASEMENT RENOVATION  
Building : WOOD STRUCTURE  
Location : BASEMENT- RENOVATED AREA ONLY  
System : WET  
Contract : C16010  
Data File : ROSA TRUE APT-BASEMENT RENOVATION.WXF

Hydraulic Design Information Sheet

Name - ROSA TRUE APARTMENTS Date - 2-18-16  
 Location - BASEMENT- RENOVATED AREA ONLY  
 Building - WOOD STRUCTURE System No. - WET  
 Contractor - RESIDENTIAL FIRE PROTECTION Contract No. - C16010  
 Calculated By - T. PRAY Drawing No. - 1 OF 1  
 Construction: (X) Combustible ( ) Non-Combustible Ceiling Height - 8'-0"  
 Occupancy - APARTMENTS (RESIDENTIAL)

S (X) NFPA 13 (X) Lt. Haz. Ord.Haz.Gp. ( ) 1 ( ) 2 ( ) 3 ( ) Ex.Haz.  
 Y ( ) NFPA 231 ( ) NFPA 231C ( ) Figure Curve

S Other

T Specific Ruling Made By Date

| M | Area of Sprinkler Operation - 946 | System Type   | Sprinkler/Nozzle   |
|---|-----------------------------------|---------------|--------------------|
|   | Density - .1                      | ( ) Wet       | Make VIKING        |
| D | Area Per Sprinkler - 176          | ( ) Dry       | Model FREEDOMVK468 |
| E | Elevation at Highest Outlet - 108 | ( ) Deluge    | Size 1/2"          |
| S | Hose Allowance - Inside -         | ( ) Preaction | K-Factor 4.9       |
| I | Rack Sprinkler Allowance -        | ( ) Other     | Temp.Rat.155       |
| G | Hose Allowance - Outside - 100    |               |                    |

N Note

Calculation Flow Required - 167.4 Press Required - 51 AT BOR  
 Summary C-Factor Used: 120 Overhead 140 Underground

| W | Water Flow Test:       | Pump Data:  | Tank or Reservoir: |
|---|------------------------|-------------|--------------------|
| A | Date of Test - 9/21/15 |             | Cap. -             |
| T | Time of Test - N/A     | Rated Cap.- | Elev.-             |
| E | Static Press - 70      | @ Press -   |                    |
| R | Residual Press - 58    | Elev. -     | Well               |
| S | Flow - 410             |             | Proof Flow         |
| U | Elevation - 104.59     |             |                    |

P Location - MAIN DRAIN TEST (SHORT DRAIN LENGTH)

L Source of Information - INSPECTION TAG AT VALVE

| C | Commodity       | Class              | Location                     |
|---|-----------------|--------------------|------------------------------|
| O | Storage Ht.     | Area               | Aisle W.                     |
| M | Storage Method: | %                  | Palletized % Rack            |
|   | ( ) Single Row  | ( ) Conven. Pallet | ( ) Auto. Storage ( ) Encap. |
| S | ( ) Double Row  | ( ) Slave Pallet   | ( ) Solid Shelf ( ) Non      |
| T | ( ) Mult. Row   |                    | ( ) Open Shelf               |

R K Flue Spacing Clearance:Storage to Ceiling  
 A Longitudinal Transverse

E Horizontal Barriers Provided:

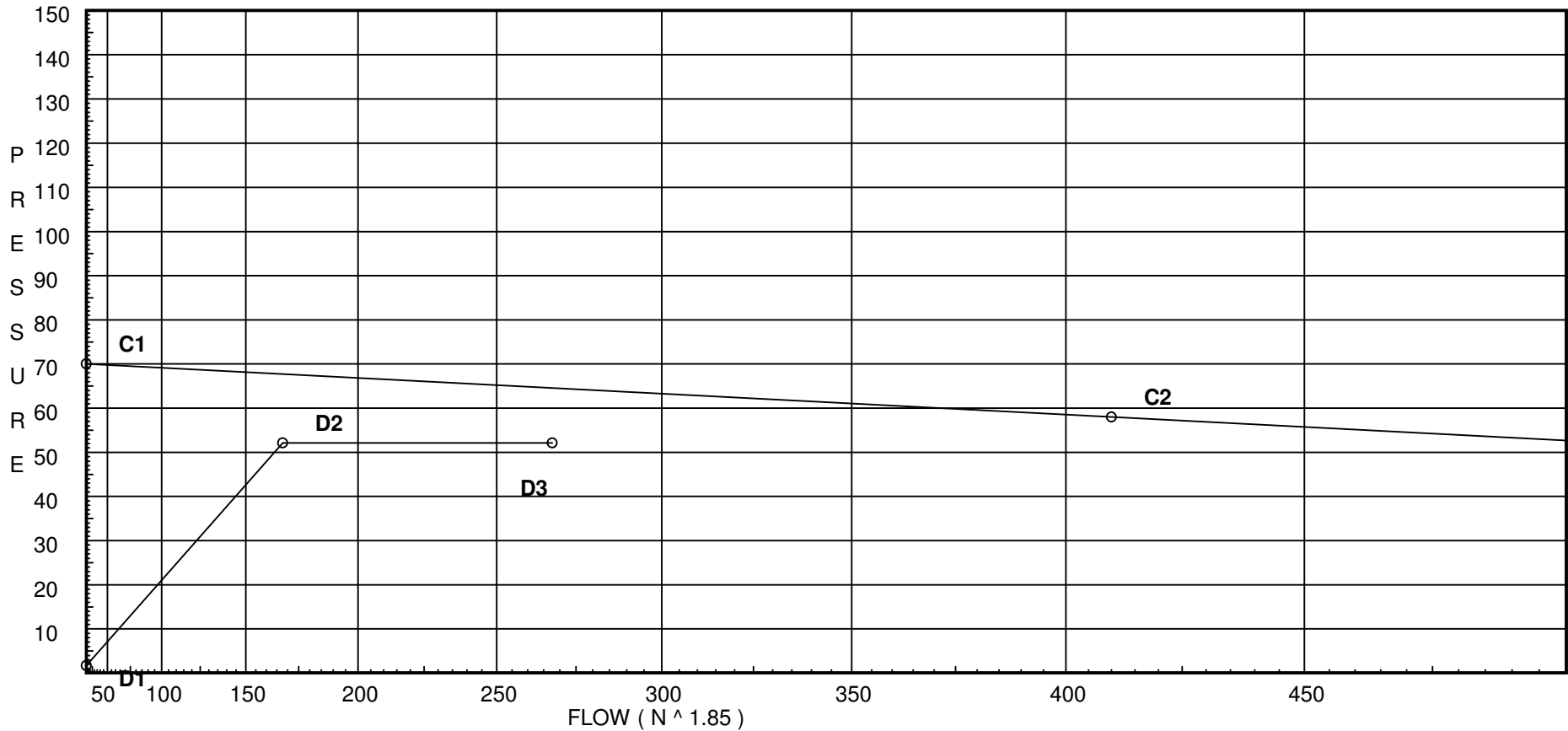
# Water Supply Curve (C)

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City Water Supply:  
C1 - Static Pressure : 70  
C2 - Residual Pressure: 58  
C2 - Residual Flow : 410

Demand:  
D1 - Elevation : 1.693  
D2 - System Flow : 167.74  
D2 - System Pressure : 52.136  
Hose ( Adj City ) : \_\_\_\_\_  
Hose ( Demand ) : 100  
D3 - System Demand : 267.74  
Safety Margin : 12.409



# Fittings Used Summary

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## Fitting Legend

| Abbrev. | Name                      | 1/2 | 3/4 | 1 | 1 1/4 | 1 1/2 | 2   | 2 1/2 | 3  | 3 1/2 | 4  | 5   | 6  | 8  | 10 | 12 | 14 | 16 | 18 | 20  | 24  |
|---------|---------------------------|-----|-----|---|-------|-------|-----|-------|----|-------|----|-----|----|----|----|----|----|----|----|-----|-----|
| E       | 90' Standard Elbow        | 2   | 2   | 2 | 3     | 4     | 5   | 6     | 7  | 8     | 10 | 12  | 14 | 18 | 22 | 27 | 35 | 40 | 45 | 50  | 61  |
| F       | 45' Elbow                 | 1   | 1   | 1 | 1     | 2     | 2   | 3     | 3  | 3     | 4  | 5   | 7  | 9  | 11 | 13 | 17 | 19 | 21 | 24  | 28  |
| I       | 90' Grvd-Vic Elbow #10    | 0   | 0   | 2 | 3     | 4     | 3.5 | 6     | 5  | 8     | 7  | 8.5 | 10 | 13 | 17 | 20 | 23 | 25 | 33 | 36  | 40  |
| S       | Generic Swing Check Valve | 4   | 5   | 5 | 7     | 9     | 11  | 14    | 16 | 19    | 22 | 27  | 32 | 45 | 55 | 65 | 76 | 87 | 98 | 109 | 130 |
| T       | 90' Flow thru Tee         | 3   | 4   | 5 | 6     | 8     | 10  | 12    | 15 | 17    | 20 | 25  | 30 | 35 | 50 | 60 | 71 | 81 | 91 | 101 | 121 |

# Pressure / Flow Summary - STANDARD

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| Node No. | Elevation | K-Fact       | Pt Actual | Pn | Flow Actual | Density | Area | Press Req. |
|----------|-----------|--------------|-----------|----|-------------|---------|------|------------|
| DO01     | 0.0       | 4.9          | 11.2      | na | 16.4        | 0.1     | 164  | 7.0        |
| DO02     | 0.0       | 4.9          | 12.9      | na | 17.6        | 0.1     | 176  | 7.0        |
| DO03     | 0.0       | 4.9          | 12.18     | na | 17.1        | 0.1     | 171  | 7.0        |
| DO04     | 0.0       | 4.9          | 11.34     | na | 16.5        | 0.1     | 165  | 7.0        |
| DO05     | 0.0       | 4.9          | 10.8      | na | 16.1        | 0.1     | 161  | 7.0        |
| DO06     | 0.0       | 4.9          | 7.0       | na | 12.96       | 0.1     | 112  | 7.0        |
| DO07     | 0.0       | 4.9          | 7.0       | na | 12.96       | 0.1     | 128  | 7.0        |
| DO08     | 0.0       | 4.9          | 7.0       | na | 12.96       | 0.1     | 128  | 7.0        |
| 1        | 108.5     | K = K @ EQ01 | 12.35     | na | 17.05       |         |      |            |
| 2        | 108.5     | K = K @ EQ02 | 13.47     | na | 17.6        |         |      |            |
| 3        | 108.5     | K = K @ EQ03 | 13.22     | na | 17.64       |         |      |            |
| 10       | 107.42    |              | 16.22     | na |             |         |      |            |
| 4        | 108.5     | K = K @ EQ04 | 18.84     | na | 21.06       |         |      |            |
| 5        | 108.5     | K = K @ EQ05 | 13.61     | na | 17.9        |         |      |            |
| 6        | 108.5     | K = K @ EQ06 | 14.83     | na | 18.45       |         |      |            |
| 11       | 108.5     |              | 17.57     | na |             |         |      |            |
| 12       | 108.5     |              | 19.88     | na |             |         |      |            |
| 13       | 107.42    |              | 46.15     | na |             |         |      |            |
| 14       | 106.67    |              | 49.5      | na |             |         |      |            |
| 7        | 108.5     | K = K @ EQ07 | 35.78     | na | 29.01       |         |      |            |
| 8        | 108.5     | K = K @ EQ08 | 35.84     | na | 29.03       |         |      |            |
| 15       | 107.42    |              | 39.69     | na |             |         |      |            |
| 16       | 107.42    |              | 40.64     | na |             |         |      |            |
| 17       | 107.42    |              | 48.03     | na |             |         |      |            |
| 18       | 107.42    |              | 48.49     | na |             |         |      |            |
| 19       | 106.67    |              | 49.79     | na |             |         |      |            |
| 20       | 106.67    |              | 49.87     | na |             |         |      |            |
| TOR      | 106.67    |              | 51.01     | na |             |         |      |            |
| BOR      | 104.59    |              | 52.14     | na | 100.0       |         |      |            |

The maximum velocity is 17.29 and it occurs in the pipe between nodes 12 and 13

# Final Calculations - Hazen-Williams

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| Hyd.<br>Ref.<br>Point | Qa<br><br>Qt                   | Dia.<br>"C"<br>Pf/Ft   | Fitting<br>or<br>Eqv. | Ln.               | Pipe<br>Ftng's<br>Total   | Pt<br>Pe<br>Pf           | Pt<br>Pv<br>Pn | ***** | Notes                              | ***** |
|-----------------------|--------------------------------|------------------------|-----------------------|-------------------|---------------------------|--------------------------|----------------|-------|------------------------------------|-------|
| DO01<br>to<br>EQ01    | 16.40<br>16.4<br>0.0<br>16.40  | 1.049<br>120<br>0.0900 | 1E                    | 2.0<br>0.0<br>0.0 | 0.500<br>2.000<br>2.500   | 11.202<br>0.0<br>0.225   |                |       | K Factor = 4.90<br>Vel = 6.09      |       |
|                       |                                |                        |                       |                   |                           | 11.427                   |                |       | K Factor = 4.85                    |       |
| DO02<br>to<br>EQ02    | 17.60<br>17.6<br>0.0<br>17.60  | 1.049<br>120<br>0.1027 | 1T                    | 5.0<br>0.0<br>0.0 | 0.500<br>5.000<br>5.500   | 12.901<br>0.0<br>0.565   |                |       | K Factor = 4.90<br>Vel = 6.53      |       |
|                       |                                |                        |                       |                   |                           | 13.466                   |                |       | K Factor = 4.80                    |       |
| DO03<br>to<br>EQ03    | 17.10<br>17.1<br>0.0<br>17.10  | 1.049<br>120<br>0.0972 | 1E                    | 2.0<br>0.0<br>0.0 | 0.500<br>2.000<br>2.500   | 12.179<br>0.0<br>0.243   |                |       | K Factor = 4.90<br>Vel = 6.35      |       |
|                       |                                |                        |                       |                   |                           | 12.422                   |                |       | K Factor = 4.85                    |       |
| DO04<br>to<br>EQ04    | 16.50<br>16.5<br>0.0<br>16.50  | 1.049<br>120<br>0.0912 | 1E                    | 2.0<br>0.0<br>0.0 | 0.500<br>2.000<br>2.500   | 11.339<br>0.0<br>0.228   |                |       | K Factor = 4.90<br>Vel = 6.13      |       |
|                       |                                |                        |                       |                   |                           | 11.567                   |                |       | K Factor = 4.85                    |       |
| DO05<br>to<br>EQ05    | 16.10<br>16.1<br>0.0<br>16.10  | 1.049<br>120<br>0.0872 | 1E                    | 2.0<br>0.0<br>0.0 | 0.500<br>2.000<br>2.500   | 10.796<br>0.0<br>0.218   |                |       | K Factor = 4.90<br>Vel = 5.98      |       |
|                       |                                |                        |                       |                   |                           | 11.014                   |                |       | K Factor = 4.85                    |       |
| DO06<br>to<br>EQ06    | 12.96<br>12.96<br>0.0<br>12.96 | 1.049<br>120<br>0.0584 | 1T                    | 5.0<br>0.0<br>0.0 | 0.500<br>5.000<br>5.500   | 7.000<br>0.0<br>0.321    |                |       | K Factor = 4.90<br>Vel = 4.81      |       |
|                       |                                |                        |                       |                   |                           | 7.321                    |                |       | K Factor = 4.79                    |       |
| DO07<br>to<br>EQ07    | 12.96<br>12.96<br>0.0<br>12.96 | 1.049<br>120<br>0.0584 | 1E                    | 2.0<br>0.0<br>0.0 | 0.500<br>2.000<br>2.500   | 7.000<br>0.0<br>0.146    |                |       | K Factor = 4.90<br>Vel = 4.81      |       |
|                       |                                |                        |                       |                   |                           | 7.146                    |                |       | K Factor = 4.85                    |       |
| DO08<br>to<br>EQ08    | 12.96<br>12.96<br>0.0<br>12.96 | 1.049<br>120<br>0.0584 | 1E                    | 2.0<br>0.0<br>0.0 | 0.500<br>2.000<br>2.500   | 7.000<br>0.0<br>0.146    |                |       | K Factor = 4.90<br>Vel = 4.81      |       |
|                       |                                |                        |                       |                   |                           | 7.146                    |                |       | K Factor = 4.85                    |       |
| 1<br>to<br>2          | 17.05<br>17.05                 | 1.049<br>120<br>0.0968 |                       | 0.0<br>0.0<br>0.0 | 11.540<br>0.0<br>11.540   | 12.349<br>0.0<br>1.117   |                |       | K Factor @ node EQ01<br>Vel = 6.33 |       |
| 2<br>to<br>10         | 17.60<br>34.65<br>0.0          | 1.38<br>120<br>0.0946  | 2E                    | 6.0<br>0.0<br>0.0 | 18.130<br>6.000<br>24.130 | 13.466<br>0.468<br>2.282 |                |       | K Factor @ node EQ02<br>Vel = 7.43 |       |

# Final Calculations - Standard

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| Hyd.<br>Ref.<br>Point | Qa<br><br>Qt  | Dia.<br>"C"<br>Pf/Ft | Fitting<br>or<br>Eqv. | Ln.         | Pipe<br>Ftng's<br>Total | Pt<br>Pe<br>Pf   | Pt<br>Pv<br>Pn | ***** | Notes                | ***** |
|-----------------------|---------------|----------------------|-----------------------|-------------|-------------------------|------------------|----------------|-------|----------------------|-------|
|                       | 34.65         |                      |                       |             |                         |                  | 16.216         |       | K Factor = 8.60      |       |
| 3<br>to<br>10         | 17.64         | 1.049<br>120         | 1E<br>1T              | 2.0<br>5.0  | 17.500<br>7.000         | 13.221<br>0.468  |                |       | K Factor @ node EQ03 |       |
|                       | 17.64         | 0.1031               |                       | 0.0         | 24.500                  | 2.527            |                |       | Vel = 6.55           |       |
| 10<br>to<br>11        | 34.65         | 1.38<br>120          | 1T                    | 6.0<br>0.0  | 3.000<br>6.000          | 16.216<br>-0.468 |                |       |                      |       |
|                       | 52.29         | 0.2027               |                       | 0.0         | 9.000                   | 1.824            |                |       | Vel = 11.22          |       |
|                       | 0.0<br>52.29  |                      |                       |             |                         |                  | 17.572         |       | K Factor = 12.47     |       |
| 4<br>to<br>12         | 21.06         | 1.049<br>120         | 1E                    | 2.0<br>0.0  | 5.250<br>2.000          | 18.838<br>0.0    |                |       | K Factor @ node EQ04 |       |
|                       | 21.06         | 0.1432               |                       | 0.0         | 7.250                   | 1.038            |                |       | Vel = 7.82           |       |
|                       | 0.0<br>21.06  |                      |                       |             |                         |                  | 19.876         |       | K Factor = 4.72      |       |
| 5<br>to<br>6          | 17.90         | 1.049<br>120         |                       | 0.0<br>0.0  | 11.550<br>0.0           | 13.609<br>0.0    |                |       | K Factor @ node EQ05 |       |
|                       | 17.9          | 0.1059               |                       | 0.0         | 11.550                  | 1.223            |                |       | Vel = 6.64           |       |
| 6<br>to<br>11         | 18.45         | 1.38<br>120          | 2E<br>1T              | 6.0<br>6.0  | 14.500<br>12.000        | 14.832<br>0.0    |                |       | K Factor @ node EQ06 |       |
|                       | 36.35         | 0.1034               |                       | 0.0         | 26.500                  | 2.740            |                |       | Vel = 7.80           |       |
| 11<br>to<br>12        | 52.29         | 1.61<br>120          | 1T                    | 8.0<br>0.0  | 1.080<br>8.000          | 17.572<br>0.0    |                |       |                      |       |
|                       | 88.64         | 0.2537               |                       | 0.0         | 9.080                   | 2.304            |                |       | Vel = 13.97          |       |
| 12<br>to<br>13        | 21.06         | 1.61<br>120          | 2I<br>1T              | 8.0<br>8.0  | 52.540<br>16.000        | 19.876<br>0.468  |                |       |                      |       |
|                       | 109.7         | 0.3765               |                       | 0.0         | 68.540                  | 25.805           |                |       | Vel = 17.29          |       |
| 13<br>to<br>14        | 0.0           | 2.067<br>120         | 2F<br>1I              | 4.0<br>3.5  | 19.670<br>7.500         | 46.149<br>0.325  |                |       |                      |       |
|                       | 109.7         | 0.1115               |                       | 0.0         | 27.170                  | 3.030            |                |       | Vel = 10.49          |       |
| 14<br>to<br>19        | 0.0           | 3.068<br>120         | 1T                    | 15.0<br>0.0 | 2.420<br>15.000         | 49.504<br>0.0    |                |       |                      |       |
|                       | 109.7         | 0.0163               |                       | 0.0         | 17.420                  | 0.284            |                |       | Vel = 4.76           |       |
|                       | 0.0<br>109.70 |                      |                       |             |                         |                  | 49.788         |       | K Factor = 15.55     |       |
| 7<br>to<br>15         | 29.01         | 1.049<br>120         | 1E<br>1T              | 2.0<br>5.0  | 6.290<br>7.000          | 35.782<br>0.468  |                |       | K Factor @ node EQ07 |       |
|                       | 29.01         | 0.2589               |                       | 0.0         | 13.290                  | 3.441            |                |       | Vel = 10.77          |       |
|                       | 0.0<br>29.01  |                      |                       |             |                         |                  | 39.691         |       | K Factor = 4.60      |       |
| 8<br>to<br>16         | 29.03         | 1.049<br>120         | 2E<br>1T              | 4.0<br>5.0  | 7.710<br>9.000          | 35.840<br>0.468  |                |       | K Factor @ node EQ08 |       |
|                       | 29.03         | 0.2593               |                       | 0.0         | 16.710                  | 4.333            |                |       | Vel = 10.78          |       |
|                       | 0.0<br>29.03  |                      |                       |             |                         |                  | 40.641         |       | K Factor = 4.55      |       |
| 15<br>to<br>16        | 29.01         | 1.38<br>120          | 1T                    | 6.0<br>0.0  | 7.960<br>6.000          | 39.691<br>0.0    |                |       |                      |       |
|                       | 29.01         | 0.0681               |                       | 0.0         | 13.960                  | 0.950            |                |       | Vel = 6.22           |       |

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| Hyd.<br>Ref.<br>Point | Qa<br><br>Qt | Dia.<br>"C"<br>Pf/Ft | Fitting<br>or<br>Eqv. Ln. | Pipe<br>Ftng's<br>Total | Pt<br>Pe<br>Pf | Pt<br>Pv<br>Pn | *****            | Notes | ***** |
|-----------------------|--------------|----------------------|---------------------------|-------------------------|----------------|----------------|------------------|-------|-------|
| 16                    | 29.03        | 1.38                 | 4E 12.0                   | 18.090                  | 40.641         |                |                  |       |       |
| to                    |              | 120                  | 0.0                       | 12.000                  | 0.0            |                |                  |       |       |
| 17                    | 58.04        | 0.2457               | 0.0                       | 30.090                  | 7.393          |                | Vel = 12.45      |       |       |
| 17                    | 0.0          | 2.067                | 1T 10.0                   | 3.330                   | 48.034         |                |                  |       |       |
| to                    |              | 120                  | 0.0                       | 10.000                  | 0.0            |                |                  |       |       |
| 18                    | 58.04        | 0.0344               | 0.0                       | 13.330                  | 0.458          |                | Vel = 5.55       |       |       |
| 18                    | 0.0          | 2.469                | 2E 12.0                   | 37.170                  | 48.492         |                |                  |       |       |
| to                    |              | 120                  | 2F 6.0                    | 30.000                  | 0.325          |                |                  |       |       |
| 19                    | 58.04        | 0.0145               | 1T 12.0                   | 67.170                  | 0.971          |                | Vel = 3.89       |       |       |
| 19                    | 109.70       | 3.068                | 0.0                       | 2.250                   | 49.788         |                |                  |       |       |
| to                    |              | 120                  | 0.0                       | 0.0                     | 0.0            |                |                  |       |       |
| 20                    | 167.74       | 0.0356               | 0.0                       | 2.250                   | 0.080          |                | Vel = 7.28       |       |       |
| 20                    | 0.0          | 4.026                | 4E 40.0                   | 79.540                  | 49.868         |                |                  |       |       |
| to                    |              | 120                  | 0.0                       | 40.000                  | 0.0            |                |                  |       |       |
| TOR                   | 167.74       | 0.0095               | 0.0                       | 119.540                 | 1.138          |                | Vel = 4.23       |       |       |
| TOR                   | 0.0          | 4.026                | 1S 22.0                   | 2.080                   | 51.006         |                |                  |       |       |
| to                    |              | 120                  | 0.0                       | 22.000                  | 0.901          |                |                  |       |       |
| BOR                   | 167.74       | 0.0095               | 0.0                       | 24.080                  | 0.229          |                | Vel = 4.23       |       |       |
|                       | 100.00       |                      |                           |                         |                |                | Qa = 100.00      |       |       |
|                       | 267.74       |                      |                           |                         | 52.136         |                | K Factor = 37.08 |       |       |