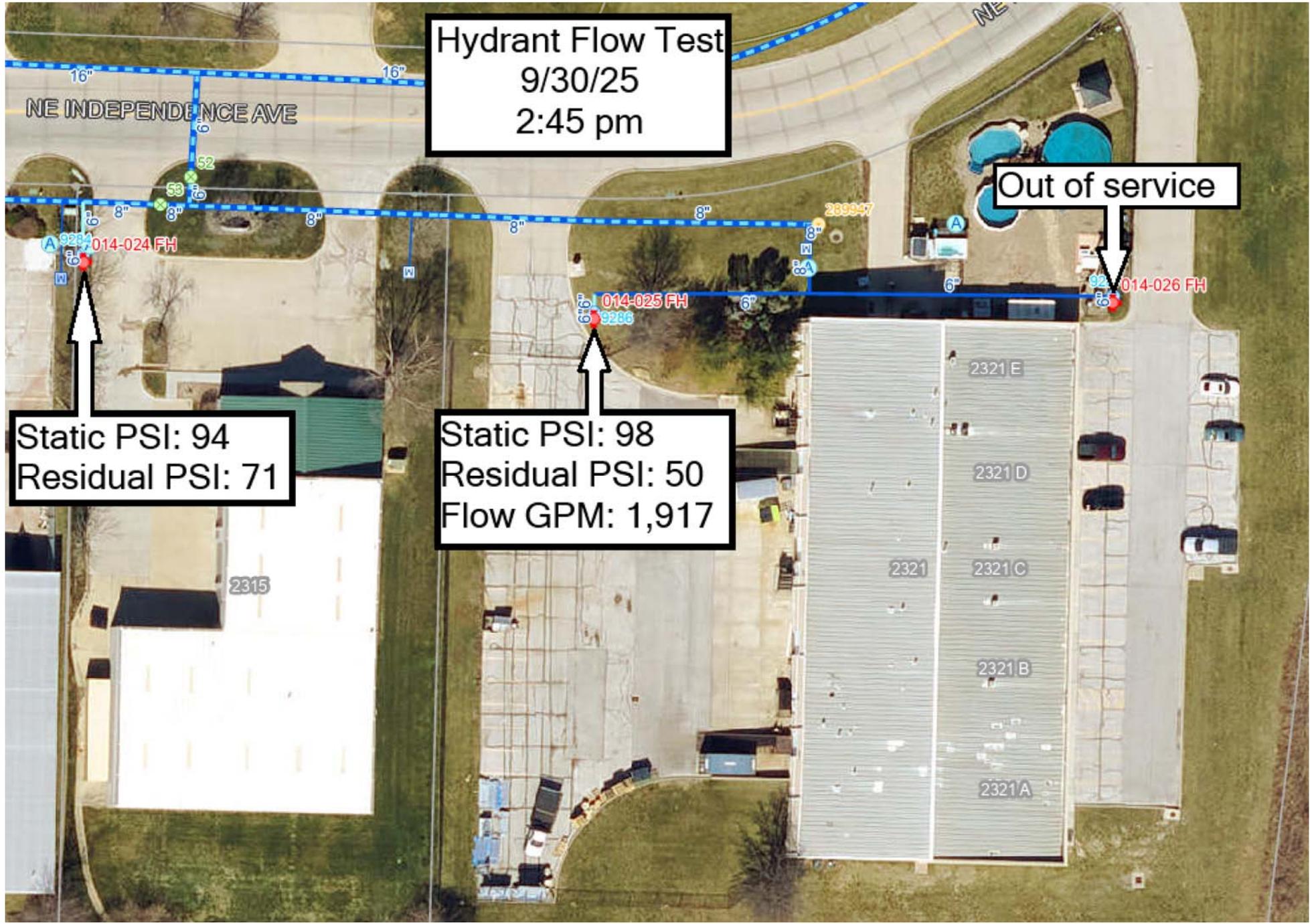


NAPA Auto Parts
2321 NE Independence Ave.
Lee's Summit, MO

Hydraulic Calculations
11/19/2025



11/19/2025



Hydrant Flow Test
9/30/25
2:45 pm

Out of service

Static PSI: 94
Residual PSI: 71

Static PSI: 98
Residual PSI: 50
Flow GPM: 1,917

NE INDEPENDENCE AVE

2321 E

2321 D

2321

2321 B

2321 A

2315

014-025 FH
9286

014-024 FH
9284

014-026 FH
9285

2399-7

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16"

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53

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Hydraulic Calculations

for

Project Name: Napa Auto Parts: (1)

Location: 2321 NE Independence Ave., Lee's Summit, MO 64064,

Drawing Name: Napa Auto Parts

Calculation Date: 10/23/2025

Design

Remote Area Number: 1

Occupancy Classification: Storage. See drawing FP1 for design criteria.

Density: Varies. See drawing FP1 for design criteria.

Area of Application: 2500ft² (Actual 2568ft²)

Coverage per Sprinkler: Varies.

Type of sprinklers calculated: Upright, Pendent

No. of sprinklers calculated: 31

No. of nozzles calculated: 0

In-rack Demand: N/A gpm at Node: N/A

Hose Streams: 500 gpm at Node: 3 Type: Allowance at Source

Total Water Required (including Hose Streams where applicable):

From Water Supply at Node 1: 2038.64 @ 55.090 (Safety Margin = 13.137)

Type of System: Wet

Volume of Dry/PreAction/Antifreeze/OtherAgent System: N/A

Name of Contractor:

Address:

Phone Number:

Name of designer: BCP

Authority Having Jurisdiction: :

Notes:

Automatic peaking results

Left: N/A

Right: N/A

Summary Notes:



Summary Of Outflowing Devices

Job Number: 1
Report Description: Extra Hazard Group II (1)

| Device | | Actual Flow (gpm) | Minimum Flow (gpm) | K-Factor (K) | Pressure (psi) | | | |
|---------------|------------|-------------------|--------------------|--------------|----------------|--|--|--|
| Floating Node | 3 | 500.00 | 500.00 | 0 | 48.360 | | | |
| Sprinkler | 131 | 28.63 | 25.20 | 8 | 12.810 | | | |
| Sprinkler | 303 | 49.45 | 38.50 | 11.2 | 19.495 | | | |
| Sprinkler | 304 | 50.36 | 38.50 | 11.2 | 20.218 | | | |
| Sprinkler | 305 | 49.48 | 38.50 | 11.2 | 19.520 | | | |
| Sprinkler | 306 | 44.17 | 38.50 | 11.2 | 15.556 | | | |
| Sprinkler | 307 | 46.06 | 38.50 | 11.2 | 16.915 | | | |
| Sprinkler | 308 | 44.20 | 38.50 | 11.2 | 15.575 | | | |
| Sprinkler | 321 | 42.02 | 38.50 | 11.2 | 14.073 | | | |
| Sprinkler | 322 | 44.38 | 38.50 | 11.2 | 15.705 | | | |
| Sprinkler | 323 | 42.04 | 38.50 | 11.2 | 14.091 | | | |
| Sprinkler | 334 | 27.72 | 25.20 | 8 | 12.004 | | | |
| Sprinkler | 335 | 40.60 | 38.50 | 11.2 | 13.144 | | | |
| Sprinkler | 336 | 41.03 | 26.00 | 8 | 26.299 | | | |
| Sprinkler | 337 | 27.46 | 27.30 | 8 | 11.778 | | | |
| Sprinkler | 338 | 39.94 | 26.00 | 8 | 24.924 | | | |
| Sprinkler | 339 | 27.41 | 27.30 | 8 | 11.741 | | | |
| Sprinkler | 340 | 43.38 | 38.50 | 11.2 | 14.999 | | | |
| Sprinkler | 341 | 40.63 | 38.50 | 11.2 | 13.160 | | | |
| Sprinkler | 351 | 39.75 | 38.50 | 11.2 | 12.598 | | | |
| Sprinkler | 352 | 42.81 | 38.50 | 11.2 | 14.609 | | | |
| Sprinkler | 353 | 39.78 | 38.50 | 11.2 | 12.614 | | | |
| Sprinkler | 417 | 112.15 | 112.00 | 22.4 | 25.068 | | | |
| Sprinkler | 418 | 112.94 | 112.00 | 22.4 | 25.422 | | | |
| Sprinkler | 419 | 48.28 | 40.00 | 11.2 | 18.586 | | | |
| Sprinkler | 420 | 48.43 | 40.00 | 11.2 | 18.695 | | | |
| ⇒ Sprinkler | 429 | 112.00 | 112.00 | 22.4 | 25.000 | | | |
| Sprinkler | 430 | 112.80 | 112.00 | 22.4 | 25.358 | | | |
| Sprinkler | 431 | 42.23 | 40.00 | 11.2 | 14.217 | | | |
| Sprinkler | 432 | 42.43 | 40.00 | 11.2 | 14.351 | | | |
| Sprinkler | 451 | 28.49 | 25.20 | 8 | 12.686 | | | |
| Sprinkler | 467 | 27.58 | 25.20 | 8 | 11.882 | | | |

⇒ Most Demanding Sprinkler Data

| Supply Analysis | | | | | | | |
|------------------------|--------------|--------------|----------------|--------------|-----------------|----------------------|-------------------------|
| Node | Name | Static (psi) | Residual (psi) | @ Flow (gpm) | Available (psi) | @ Total Demand (gpm) | Required Pressure (psi) |
| 1 | Water Supply | 94.000 | 71.000 | 1917.00 | 68.227 | 2038.64 | 55.090 |

| Node Analysis | | | | | |
|----------------------|------------------|-----------|------------------------|-------------------------|-------|
| Node Number | Elevation (Foot) | Node Type | Pressure at Node (psi) | Discharge at Node (gpm) | Notes |
| 1 | -4-0 | Supply | 55.090 | 2038.64 | |
| 3 | -4-0 | | 48.360 | 500.00 | |
| 131 | 21-0½ | Sprinkler | 12.810 | 28.63 | |
| 303 | 18-11 | Sprinkler | 19.495 | 49.45 | |
| 304 | 18-11 | Sprinkler | 20.218 | 50.36 | |
| 305 | 18-11 | Sprinkler | 19.520 | 49.48 | |
| 306 | 19-6½ | Sprinkler | 15.556 | 44.17 | |
| 307 | 19-6½ | Sprinkler | 16.915 | 46.06 | |
| 308 | 19-6½ | Sprinkler | 15.575 | 44.20 | |
| 321 | 20-2 | Sprinkler | 14.073 | 42.02 | |
| 322 | 20-2 | Sprinkler | 15.705 | 44.38 | |
| 323 | 20-2 | Sprinkler | 14.091 | 42.04 | |
| 334 | 22-1½ | Sprinkler | 12.004 | 27.72 | |
| 335 | 20-9½ | Sprinkler | 13.144 | 40.60 | |
| 336 | 8-10 | Sprinkler | 26.299 | 41.03 | |
| 337 | 22-2½ | Sprinkler | 11.778 | 27.46 | |
| 338 | 8-10 | Sprinkler | 24.924 | 39.94 | |
| 339 | 22-2½ | Sprinkler | 11.741 | 27.41 | |

| Node Number | Elevation (Foot) | Node Type | Pressure at Node (psi) | Discharge at Node (gpm) | Notes |
|-------------|------------------|-----------|------------------------|-------------------------|-------|
| 340 | 20-9½ | Sprinkler | 14.999 | 43.38 | |
| 341 | 20-9½ | Sprinkler | 13.160 | 40.63 | |
| 351 | 21-5 | Sprinkler | 12.598 | 39.75 | |
| 352 | 21-5 | Sprinkler | 14.609 | 42.81 | |
| 353 | 21-5 | Sprinkler | 12.614 | 39.78 | |
| 417 | 19-5 | Sprinkler | 25.068 | 112.15 | |
| 418 | 19-5 | Sprinkler | 25.422 | 112.94 | |
| 419 | 19-1 | Sprinkler | 18.586 | 48.28 | |
| 420 | 19-1 | Sprinkler | 18.695 | 48.43 | |
| 429 | 20-2½ | Sprinkler | 25.000 | 112.00 | |
| 430 | 20-2½ | Sprinkler | 25.358 | 112.80 | |
| 431 | 20-0 | Sprinkler | 14.217 | 42.23 | |
| 432 | 20-0 | Sprinkler | 14.351 | 42.43 | |
| 451 | 21-0½ | Sprinkler | 12.686 | 28.49 | |
| 467 | 22-1½ | Sprinkler | 11.882 | 27.58 | |
| 6 | 1-2 | Gauge | 45.480 | 0.00 | BOR |
| 37 | 1-7½ | | 45.276 | 0.00 | |
| 43 | 14-4½ | | 39.071 | 0.00 | |
| 55 | 19-2 | | 19.670 | 0.00 | |
| 56 | 19-2 | | 20.402 | 0.00 | |
| 57 | 19-2 | | 19.695 | 0.00 | |
| 59 | 19-6½ | | 25.654 | 0.00 | |

| Node Number | Elevation (Foot) | Node Type | Pressure at Node (psi) | Discharge at Node (gpm) | Notes |
|-------------|------------------|-----------|------------------------|-------------------------|-------|
| 60 | 19-6½ | | 26.017 | 0.00 | |
| 62 | 19-2 | | 19.161 | 0.00 | |
| 63 | 19-2 | | 19.251 | 0.00 | |
| 64 | 16-3½ | | 26.916 | 0.00 | |
| 65 | 16-3½ | | 26.920 | 0.00 | |
| 66 | 16-3½ | | 26.949 | 0.00 | |
| 67 | 16-3½ | | 26.916 | 0.00 | |
| 70 | 16-3½ | | 27.039 | 0.00 | |
| 71 | 16-3½ | | 27.182 | 0.00 | |
| 72 | 16-3½ | | 27.216 | 0.00 | |
| 73 | 16-3½ | | 27.419 | 0.00 | |
| 74 | 16-3½ | | 27.786 | 0.00 | |
| 158 | 21-9½ | | 12.414 | 0.00 | |
| 161 | 21-9½ | | 12.430 | 0.00 | |
| 168 | 10-1½ | | 28.819 | 0.00 | |
| 190 | 9-6½ | | 28.796 | 0.00 | |
| 201 | 9-7½ | | 28.927 | 0.00 | |
| 231 | 9-7½ | | 29.156 | 0.00 | |
| 236 | 9-7½ | | 29.907 | 0.00 | |

Pipe Information

| Node 1 | Elev 1 (Foot) | K-Factor | Flow added this step (q) | Nominal ID | Fittings & Devices | Length (Foot) | C Factor | Total(Pt) | Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value. |
|--------------|---------------|--------------|--------------------------|----------------|--------------------|----------------------|----------------|---------------------------------|--|
| | Node 2 | | Elev 2 (Foot) | Total Flow (Q) | Actual ID | Equiv. Length (Foot) | Fitting (Foot) | Pf Friction Loss Per Unit (psi) | |
| Total (Foot) | | Friction(Pf) | | | | | | | |
| 429 | 20-2½ | 22.4 | 112.00 | 3 | (See Notes) | 8-4 | 120 | 25.000 | ••••• Route 1 ••••• Sprinkler, PO(20-2) |
| 59 | 19-6½ | | 112.00 | 3.2600 | | 20-2 | 0.012599 | 0.296 | |
| | | | | | | 28-5½ | | 0.359 | |
| 59 | 19-6½ | | 112.15 | 4 | (See Notes) | 3-3 | 120 | 25.654 | Flow (q) from Route 2 PO(26-4) |
| 73 | 16-3½ | | 224.15 | 4.2600 | | 26-4 | 0.012357 | 1.399 | |
| | | | | | | 29-7 | | 0.365 | |
| 73 | 16-3½ | | 966.04 | 6 | | 9-6 | 120 | 27.419 | Flow (q) from Route 4 |
| 74 | 16-3½ | | 1190.19 | 6.3570 | | | 0.038611 | -0.000 | |
| | | | | | | 9-6 | | 0.368 | |
| 74 | 16-3½ | | 225.74 | 6 | (See Notes) | 158-6 | 120 | 27.786 | Flow (q) from Route 5 3fE(12-7) |
| 43 | 14-4½ | | 1415.93 | 6.3570 | | 37-8½ | 0.053241 | 0.837 | |
| | | | | | | 196-3 | | 10.447 | |
| 43 | 14-4½ | | 122.71 | 6 | (See Notes) | 11-0 | 120 | 39.071 | Flow (q) from Route 3 f(-0.000), BFP |
| 37 | 1-7½ | | 1538.64 | 6.3570 | | | 0.062090 | 5.522 | |
| | | | | | | 11-0 | | 0.684 | |
| 37 | 1-7½ | | | 8 | (See Notes) | 0-0 | 140 | 45.276 | BOR |
| 6 | 1-2 | | 1538.64 | 8.3900 | | | 0.012086 | 0.204 | |
| | | | | | | 0-0 | | 0.000 | |
| 6 | 1-2 | | | 8 | (See Notes) | 22-5 | 140 | 45.480 | E(30-6½), FN |
| 3 | -4-0 | | 1538.64 | 8.3900 | | 30-6½ | 0.012086 | 2.240 | |
| | | | | | | 52-11½ | | 0.640 | |
| 3 | -4-0 | | 500.00 | 8 | (See Notes) | 300-4 | 140 | 48.360 | E(30-6½), S |
| 1 | -4-0 | | 2038.64 | 8.3900 | | 30-6½ | 0.020341 | | |
| | | | | | | 330-10½ | | 6.730 | |
| | | | 0.00 | | | | | 55.090 | Hose Allowance At Source |
| 1 | | | 2038.64 | | | | | | Total(Pt) Route 1 |
| 417 | 19-5 | 22.4 | 112.15 | 2½ | (See Notes) | 1-2½ | 120 | 25.068 | ••••• Route 2 ••••• Sprinkler, PO(16-5½) |
| 59 | 19-6½ | | 112.15 | 2.6350 | | 16-5½ | 0.035611 | -0.043 | |
| | | | | | | 17-8½ | | 0.630 | |
| | | | | | | | | 25.654 | Total(Pt) Route 2 |
| 339 | 22-2½ | 8 | 27.41 | 1½ | (See Notes) | 7-7½ | 120 | 11.741 | ••••• Route 3 ••••• Sprinkler, E(3-2), PO(9-11) |
| 158 | 21-9½ | | 27.41 | 1.6820 | | 13-0½ | 0.023392 | 0.190 | |
| | | | | | | 20-8 | | 0.483 | |

Pipe Information

| Node 1 | Elev 1 (Foot) | K-Factor | Flow added this step (q) | Nominal ID | Fittings & Devices | Length (Foot) | C Factor | Total(Pt) | Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value. |
|--------|---------------|--------------|--------------------------|----------------|--------------------|---------------|----------------------|---------------------------------|--|
| | Node 2 | | Elev 2 (Foot) | Total Flow (Q) | | Actual ID | Equiv. Length (Foot) | Pf Friction Loss Per Unit (psi) | |
| | | Total (Foot) | Friction(Pf) | | | | | | |
| 158 | 21-9½ | | | 2 | | 4-3½ | 120 | 12.414 | |
| 351 | 21-5 | | 27.41 | 2.1570 | | | 0.006966 | 0.154 | |
| | | | | | | 4-3½ | | 0.030 | |
| 351 | 21-5 | 11.2 | 39.75 | 2 | (See Notes) | 7-6½ | 120 | 12.598 | Sprinkler |
| 335 | 20-9½ | | 67.16 | 2.1570 | | 7-6½ | 0.036561 | 0.270 | |
| | | | | | | | | 0.276 | |
| 335 | 20-9½ | 11.2 | 40.60 | 2 | (See Notes) | 7-6½ | 120 | 13.144 | Sprinkler |
| 321 | 20-2 | | 107.77 | 2.1570 | | 7-6½ | 0.087684 | 0.270 | |
| | | | | | | | | 0.660 | |
| 321 | 20-2 | 11.2 | 42.02 | 2 | (See Notes) | 7-6½ | 120 | 14.073 | Sprinkler |
| 306 | 19-6½ | | 149.78 | 2.1570 | | 7-6½ | 0.161220 | 0.270 | |
| | | | | | | | | 1.213 | |
| 306 | 19-6½ | 11.2 | 44.17 | 2 | (See Notes) | 4-8½ | 120 | 15.556 | Sprinkler, T(10-5½) |
| 55 | 19-2 | | 193.96 | 2.1570 | | 10-5½ | 0.260054 | 0.169 | |
| | | | | | | 15-2 | | 3.945 | |
| 55 | 19-2 | | 49.45 | 2 | (See Notes) | 2-10½ | 120 | 19.670 | Flow (q) from Route 14 PO(12-3½) |
| 64 | 16-3½ | | 243.41 | 2.1570 | | 12-3½ | 0.395849 | 1.239 | |
| | | | | | | 15-2 | | 6.007 | |
| 64 | 16-3½ | | | 6 | | 0-3 | 120 | 26.916 | |
| 67 | 16-3½ | | 243.41 | 6.3570 | | 0-3 | 0.002049 | -0.000 | |
| | | | | | | | | 0.001 | |
| 67 | 16-3½ | | | 2½ | (See Notes) | 207-10½ | 120 | 26.916 | PO(16-5½) 2PO(16-5½), 2fE(5-10½) |
| 43 | 14-4½ | | 122.71 | 2.6350 | | 61-2½ | 0.042062 | 0.836 | |
| | | | | | | 269-1 | | 11.318 | |
| | | | | | | | | 39.071 | Total(Pt) Route 3 |
| 337 | 22-2½ | 8 | 27.46 | 1½ | (See Notes) | 6-8 | 120 | 11.778 | ••••• Route 4 ••••• Sprinkler, E(3-2), PO(9-11) |
| 161 | 21-9½ | | 27.46 | 1.6820 | | 13-0½ | 0.023461 | 0.190 | |
| | | | | | | 19-8½ | | 0.462 | |
| 161 | 21-9½ | | | 2 | | 4-3½ | 120 | 12.430 | |
| 353 | 21-5 | | 27.46 | 2.1570 | | | 0.006987 | 0.154 | |
| | | | | | | 4-3½ | | 0.030 | |
| 353 | 21-5 | 11.2 | 39.78 | 2 | (See Notes) | 7-6½ | 120 | 12.614 | Sprinkler |
| 341 | 20-9½ | | 67.23 | 2.1570 | | | 0.036630 | 0.270 | |
| | | | | | | 7-6½ | | 0.276 | |

Pipe Information

| Node 1 | Elev 1 (Foot) | K-Factor | Flow added this step (q) | Nominal ID | Fittings & Devices | Length (Foot) | C Factor | Total(Pt) | Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value. |
|--------|---------------|--------------|--------------------------|----------------|--------------------|---------------|----------------|---------------------------------|--|
| | Node 2 | | Elev 2 (Foot) | Total Flow (Q) | | Actual ID | Fitting (Foot) | Pf Friction Loss Per Unit (psi) | |
| | | Total (Foot) | | | Friction(Pf) | | | | |
| 341 | 20-9½ | 11.2 | 40.63 | 2 | (See Notes) | 7-6½ | 120 | 13.160 | |
| 323 | 20-2 | | 107.86 | 2.1570 | | 7-6½ | 0.087827 | 0.270 | |
| | | | | | | | | 0.661 | |
| 323 | 20-2 | 11.2 | 42.04 | 2 | (See Notes) | 7-6½ | 120 | 14.091 | Sprinkler |
| 308 | 19-6½ | | 149.91 | 2.1570 | | 7-6½ | 0.161462 | 0.270 | |
| | | | | | | | | 1.215 | |
| 308 | 19-6½ | 11.2 | 44.20 | 2 | (See Notes) | 4-8½ | 120 | 15.575 | Sprinkler, T(10-5½) |
| 57 | 19-2 | | 194.11 | 2.1570 | | 10-5½ | 0.260426 | 0.169 | |
| | | | | | | 15-2 | | | |
| 57 | 19-2 | | 49.48 | 2 | (See Notes) | 2-10½ | 120 | 19.695 | Flow (q) from Route 15 PO(12-3½) |
| 66 | 16-3½ | | 243.59 | 2.1570 | | 12-3½ | 0.396396 | 1.239 | |
| | | | | | | 15-2 | | | |
| 66 | 16-3½ | | 347.69 | 6 | | 8-6½ | 120 | 26.949 | Flow (q) from Route 11 |
| 70 | 16-3½ | | 591.28 | 6.3570 | | 8-6½ | 0.010584 | -0.000 | |
| | | | | | | | | | |
| 70 | 16-3½ | | 146.59 | 6 | | 8-11 | 120 | 27.039 | Flow (q) from Route 7 |
| 71 | 16-3½ | | 737.87 | 6.3570 | | 8-11 | 0.015943 | -0.000 | |
| | | | | | | | | | |
| 71 | 16-3½ | | 147.21 | 6 | | 1-7 | 120 | 27.182 | Flow (q) from Route 8 |
| 72 | 16-3½ | | 885.07 | 6.3570 | | 1-7 | 0.022322 | -0.000 | |
| | | | | | | | | | |
| 72 | 16-3½ | | 80.97 | 6 | | 7-8½ | 120 | 27.216 | Flow (q) from Route 17 |
| 73 | 16-3½ | | 966.04 | 6.3570 | | 7-8½ | 0.026246 | -0.000 | |
| | | | | | | | | | |
| | | | | | | | | 27.419 | Total(Pt) Route 4 |
| 430 | 20-2½ | 22.4 | 112.80 | 3 | (See Notes) | 8-4 | 120 | 25.358 | ••••• Route 5 ••••• Sprinkler, PO(20-2) |
| 60 | 19-6½ | | 112.80 | 3.2600 | | 20-2 | 0.012766 | 0.295 | |
| | | | | | | 28-5½ | | | |
| 60 | 19-6½ | | 112.94 | 4 | (See Notes) | 3-3 | 120 | 26.017 | Flow (q) from Route 6 PO(26-4) |
| 74 | 16-3½ | | 225.74 | 4.2600 | | 26-4 | 0.012520 | 1.399 | |
| | | | | | | 29-7 | | | |
| | | | | | | | | 27.786 | Total(Pt) Route 5 |

Pipe Information

| Node 1 | Elev 1 (Foot) | K-Factor | Flow added this step (q) | Nominal ID | Fittings & Devices | Length (Foot) | C Factor | Total(Pt) | Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value. | |
|--------|---------------|----------|--------------------------|------------|--------------------|---------------|----------|-----------|--|------------------------------------|
| | | | | | | | | | | Node 2 |
| 418 | 19-5 | 22.4 | 112.94 | 2½ | (See Notes) | 1-2½ | 120 | 25.422 | | |
| 60 | 19-6½ | | 112.94 | 2.6350 | | 16-5½ | 0.036077 | -0.043 | | |
| | | | | | | 17-8½ | | 0.638 | | |
| | | | | | | | | 26.017 | Total(Pt) Route 6 | |
| 431 | 20-0 | 11.2 | 56.07 | 1½ | (See Notes) | 10-3 | 120 | 14.217 | ••••• Route 7 ••••• Sprinkler,, Flow (q) from Route 9 T(8-2½) | |
| 62 | 19-2 | | 98.30 | 1.6820 | | 8-2½ | 0.248377 | 0.367 | | |
| | | | | | | 18-5 | | 4.577 | | |
| 62 | 19-2 | | 48.28 | 1½ | (See Notes) | 2-10½ | 120 | 19.161 | | Flow (q) from Route 12 PO(9-11) |
| 70 | 16-3½ | | 146.59 | 1.6820 | | 9-11 | 0.520172 | 1.238 | | |
| | | | | | | 12-9 | | 6.640 | | |
| | | | | | | | | 27.039 | Total(Pt) Route 7 | |
| 432 | 20-0 | 11.2 | 56.35 | 1½ | (See Notes) | 10-3 | 120 | 14.351 | ••••• Route 8 ••••• Sprinkler,, Flow (q) from Route 10 T(7-10½) | |
| 63 | 19-2 | | 98.78 | 1.6820 | | 7-10½ | 0.250617 | 0.367 | | |
| | | | | | | 18-1 | | 4.533 | | |
| 63 | 19-2 | | 48.43 | 1½ | (See Notes) | 2-10½ | 120 | 19.251 | | Flow (q) from Route 13 PO(9-11) |
| 71 | 16-3½ | | 147.21 | 1.6820 | | 9-11 | 0.524252 | 1.238 | | |
| | | | | | | 12-9 | | 6.692 | | |
| | | | | | | | | 27.182 | Total(Pt) Route 8 | |
| 467 | 22-1½ | 8 | 27.58 | 1½ | (See Notes) | 13-6 | 120 | 11.882 | ••••• Route 9 ••••• Sprinkler | |
| 451 | 21-0½ | | 27.58 | 1.6820 | | | 0.023653 | 0.484 | | |
| | | | | | | 13-6 | | 0.319 | | |
| 451 | 21-0½ | 8 | 28.49 | 1½ | (See Notes) | 12-4½ | 120 | 12.686 | | Sprinkler |
| 431 | 20-0 | | 56.07 | 1.6820 | | | 0.087910 | 0.443 | | |
| | | | | | | 12-4½ | | 1.088 | | |
| | | | | | | | | 14.217 | Total(Pt) Route 9 | |
| 334 | 22-1½ | 8 | 27.72 | 1½ | (See Notes) | 13-6 | 120 | 12.004 | ••••• Route 10 ••••• Sprinkler | |
| 131 | 21-0½ | | 27.72 | 1.6820 | | | 0.023876 | 0.484 | | |
| | | | | | | 13-6 | | 0.322 | | |
| 131 | 21-0½ | 8 | 28.63 | 1½ | (See Notes) | 12-4½ | 120 | 12.810 | | Sprinkler |
| 432 | 20-0 | | 56.35 | 1.6820 | | | 0.088722 | 0.443 | | |
| | | | | | | 12-4½ | | 1.098 | | |
| | | | | | | | | 14.351 | Total(Pt) Route 10 | |

Pipe Information

| Node 1 | Elev 1 (Foot) | K-Factor | Flow added this step (q) | Nominal ID | Fittings & Devices | Length (Foot) | C Factor | Total(Pt) | Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value. | |
|--------|---------------|----------|--------------------------|------------|--------------------|---------------|----------|-----------|--|--------|
| | | | | | | | | | | Node 2 |
| 352 | 21-5 | 11.2 | 42.81 | 2 | (See Notes) | 7-6½ | 120 | 14.609 | | |
| 340 | 20-9½ | | 42.81 | 2.1570 | | 7-6½ | 0.015890 | 0.270 | | |
| | | | | | | | | 0.120 | | |
| 340 | 20-9½ | 11.2 | 43.38 | 2 | (See Notes) | 7-6½ | 120 | 14.999 | Sprinkler | |
| 322 | 20-2 | | 86.18 | 2.1570 | | 7-6½ | 0.057989 | 0.270 | | |
| | | | | | | | | 0.436 | | |
| 322 | 20-2 | 11.2 | 44.38 | 2 | (See Notes) | 7-6½ | 120 | 15.705 | Sprinkler | |
| 307 | 19-6½ | | 130.57 | 2.1570 | | 7-6½ | 0.125056 | 0.270 | | |
| | | | | | | | | 0.941 | | |
| 307 | 19-6½ | 11.2 | 46.06 | 2 | (See Notes) | 4-8½ | 120 | 16.915 | Sprinkler, T(10-5½) | |
| 56 | 19-2 | | 176.63 | 2.1570 | | 10-5½ | 0.218717 | 0.169 | | |
| | | | | | | 15-2 | | 3.318 | | |
| 56 | 19-2 | | 50.36 | 2 | (See Notes) | 2-10½ | 120 | 20.402 | Flow (q) from Route 16 PO(12-3½) | |
| 65 | 16-3½ | | 226.99 | 2.1570 | | 12-3½ | 0.347877 | 1.239 | | |
| | | | | | | 15-2 | | 5.279 | | |
| 65 | 16-3½ | | 120.70 | 6 | | 7-4 | 120 | 26.920 | Flow (q) from Route 19 | |
| 66 | 16-3½ | | 347.69 | 6.3570 | | 7-4 | 0.003963 | -0.000 | | |
| | | | | | | | | 0.029 | | |
| | | | | | | | | 26.949 | Total(Pt) Route 11 | |
| 419 | 19-1 | 11.2 | 48.28 | 1½ | (See Notes) | 0-11 | 120 | 18.586 | ***** Route 12 ***** Sprinkler, T(8-2½) | |
| 62 | 19-2 | | 48.28 | 1.6820 | | 8-2½ | 0.066669 | -0.033 | | |
| | | | | | | 9-1½ | | 0.609 | | |
| | | | | | | | | 19.161 | Total(Pt) Route 12 | |
| 420 | 19-1 | 11.2 | 48.43 | 1½ | (See Notes) | 0-11 | 120 | 18.695 | ***** Route 13 ***** Sprinkler, T(7-10½) | |
| 63 | 19-2 | | 48.43 | 1.6820 | | 7-10½ | 0.067032 | -0.033 | | |
| | | | | | | 8-9½ | | 0.589 | | |
| | | | | | | | | 19.251 | Total(Pt) Route 13 | |
| 303 | 18-11 | 11.2 | 49.45 | 2 | (See Notes) | 2-10 | 120 | 19.495 | ***** Route 14 ***** Sprinkler, T(10-5½) | |
| 55 | 19-2 | | 49.45 | 2.1570 | | 10-5½ | 0.020751 | -0.101 | | |
| | | | | | | 13-3½ | | 0.275 | | |
| | | | | | | | | 19.670 | Total(Pt) Route 14 | |

Pipe Information

| Node 1 | Elev 1 (Foot) | K-Factor | Flow added this step (q) | Nominal ID | Fittings & Devices | Length (Foot) | C Factor | Total(Pt) | Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value. | |
|--------|---------------|----------|--------------------------|------------|--------------------|---------------|----------|-----------|--|----------------------|
| | | | | | | | | | | Node 2 |
| 305 | 18-11 | 11.2 | 49.48 | 2 | (See Notes) | 2-10 | 120 | 19.520 | | |
| 57 | 19-2 | | 49.48 | 2.1570 | | 10-5½ | 0.020776 | -0.101 | | |
| | | | | | | 13-3½ | | 0.276 | | |
| | | | | | | | | 19.695 | Total(Pt) Route 15 | |
| 304 | 18-11 | 11.2 | 50.36 | 2 | (See Notes) | 2-10 | 120 | 20.218 | ••••• Route 16 ••••• Sprinkler, T(10-5½) | |
| 56 | 19-2 | | 50.36 | 2.1570 | | 10-5½ | 0.021462 | -0.101 | | |
| | | | | | | 13-3½ | | 0.285 | | |
| | | | | | | | | 20.402 | | Total(Pt) Route 16 |
| 338 | 8-10 | 8 | 39.94 | 1 | (See Notes) | 2-3½ | 120 | 24.924 | ••••• Route 17 ••••• Sprinkler, E(2-0), PO(5-0) | |
| 201 | 9-7½ | | 39.94 | 1.0490 | | 7-0 | 0.467808 | -0.337 | | |
| | | | | | | 9-3½ | | 4.340 | | |
| 201 | 9-7½ | | | 2 | (See Notes) | 4-1 | 120 | 28.927 | | PO(12-3½) |
| 231 | 9-7½ | | 39.94 | 2.1570 | | 12-3½ | 0.013976 | | | |
| | | | | | | 16-4½ | | 0.229 | | |
| 231 | 9-7½ | | 41.03 | 2½ | (See Notes) | 22-0½ | 120 | 29.156 | Flow (q) from Route 18 PO(16-5½) | |
| 236 | 9-7½ | | 80.97 | 2.6350 | | 16-5½ | 0.019490 | 0.000 | | |
| | | | | | | 38-6 | | 0.750 | | |
| 236 | 9-7½ | | | 4 | (See Notes) | 55-4 | 120 | 29.907 | | 3fE(8-11½), PO(26-4) |
| 72 | 16-3½ | | 80.97 | 4.2600 | | 53-2½ | 0.001878 | -2.894 | | |
| | | | | | | 108-6½ | | 0.204 | | |
| | | | | | | | | 27.216 | Total(Pt) Route 17 | |
| 336 | 8-10 | 8 | 41.03 | 1 | (See Notes) | 0-8 | 120 | 26.299 | ••••• Route 18 ••••• Sprinkler, PO(5-0) | |
| 190 | 9-6½ | | 41.03 | 1.0490 | | 5-0 | 0.491626 | -0.294 | | |
| | | | | | | 5-8 | | 2.792 | | |
| 190 | 9-6½ | | | 2 | (See Notes) | 2-7 | 120 | 28.796 | | fE(4-3½), PO(12-3½) |
| 168 | 10-1½ | | 41.03 | 2.1570 | | 16-7½ | 0.014688 | -0.260 | | |
| | | | | | | 19-2½ | | 0.282 | | |
| 168 | 10-1½ | | | 2½ | (See Notes) | 10-0 | 120 | 28.819 | 2fE(5-11) | |
| 231 | 9-7½ | | 41.03 | 2.6350 | | 11-9½ | 0.005541 | 0.217 | | |
| | | | | | | 21-9½ | | 0.121 | | |
| | | | | | | | | 29.156 | | Total(Pt) Route 18 |

Pipe Information

| Node 1 | Elev 1 (Foot) | K-Factor | Flow added this step (q) | Nominal ID | Fittings & Devices | Length (Foot) | C Factor | Total(Pt) | Notes |
|--------|------------------|----------|--------------------------------|------------|-----------------------|------------------|----------|-----------|---|
| | | | | | | | | | |
| 67 | 16-3½ | | 122.71 | 6 | | 7-1 | 120 | 26.916 | |
| 65 | 16-3½ | | 120.70 | 6.3570 | | 7-1 | 0.000560 | -0.000 | |
| | | | | | | | | 0.004 | ••••• Route 19 ••••• Flow (q) from Route 3 |
| | | | | | | | | 26.920 | Total(Pt) Route 19 |

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

C Value Multiplier

$$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}} \right)^{4.87} = \text{Factor}$$

| | | | | |
|--------------------|-------|------|------|------|
| Value Of C | 100 | 130 | 140 | 150 |
| Multiplying Factor | 0.713 | 1.16 | 1.33 | 1.51 |

Fittings Legend

| | | |
|--------------------------------|---------------------------|----------------------------|
| ALV Alarm Valve | AngV Angle Valve | b Bushing |
| BalV Ball Valve | BFP Backflow Preventer | BV Butterfly Valve |
| C Cross Flow Turn 90° | cplg Coupling | Cr Cross Run |
| CV Check Valve | DelV Deluge Valve | DPV Dry Pipe Valve |
| E 90° Elbow | EE 45° Elbow | Ee1 11¼° Elbow |
| Ee2 22½° Elbow | f Flow Device | fd Flex Drop |
| FDC Fire Department Connection | fE 90° FireLock(TM) Elbow | fEE 45° FireLock(TM) Elbow |
| flg Flange | FN Floating Node | fT FireLock(TM) Tee |
| g Gauge | GloV Globe Valve | GV Gate Valve |
| Ho Hose | Hose Hose | HV Hose Valve |
| Hyd Hydrant | LtE Long Turn Elbow | mecT Mechanical Tee |
| Noz Nozzle | P1 Pump In | P2 Pump Out |
| PIV Post Indicating Valve | PO Pipe Outlet | PrV Pressure Relief Valve |
| PRV Pressure Reducing Valve | red Reducer/Adapter | S Supply |
| sCV Swing Check Valve | SFx Seismic Flex | Spr Sprinkler |
| St Strainer | T Tee Flow Turn 90° | Tr Tee Run |
| U Union | WirF Wirsbo | WMV Water Meter Valve |
| Z Cap | | |

Hydraulic Calculations

for

Project Name: Napa Auto Parts: (1)

Location: 2321 NE Independence Ave., Lee's Summit, MO 64064,

Drawing Name: Napa Auto Parts

Calculation Date: 10/23/2025

Design

Remote Area Number: 2

Occupancy Classification: Extra Hazard Group II

Density 0.40gpm/ft²

Area of Application: 2000ft² (Actual 2013ft²)

Coverage per Sprinkler: 90ft²

Type of sprinklers calculated: Pendent

No. of sprinklers calculated: 25

No. of nozzles calculated: 0

In-rack Demand: N/A gpm at Node: N/A

Hose Streams: 500 gpm at Node: 3 Type: Allowance at Source

Total Water Required (including Hose Streams where applicable):

From Water Supply at Node 1: 1413.99 @ 63.317 (Safety Margin = 17.585)

Type of System: Wet

Volume of Dry/PreAction/Antifreeze/OtherAgent System: N/A

Name of Contractor:

Address:

Phone Number:

Name of designer: BCP

Authority Having Jurisdiction: :

Notes:

Automatic peaking results

Left: N/A

Right: N/A

Summary Notes:



Summary Of Outflowing Devices

| Device | | Actual Flow (gpm) | Minimum Flow (gpm) | K-Factor (K) | Pressure (psi) | | | |
|--------------------|------------|-------------------|--------------------|--------------|----------------|--|--|--|
| Floating Node | 3 | 500.00 | 500.00 | 0 | 59.897 | | | |
| Sprinkler | 469 | 30.29 | 21.00 | 8 | 14.338 | | | |
| Sprinkler | 470 | 31.97 | 21.00 | 8 | 15.970 | | | |
| Sprinkler | 471 | 43.90 | 36.00 | 11.2 | 15.365 | | | |
| Sprinkler | 472 | 43.19 | 36.00 | 11.2 | 14.871 | | | |
| Sprinkler | 475 | 28.95 | 21.00 | 8 | 13.093 | | | |
| Sprinkler | 476 | 30.56 | 21.00 | 8 | 14.591 | | | |
| Sprinkler | 477 | 42.82 | 36.00 | 11.2 | 14.620 | | | |
| Sprinkler | 478 | 42.07 | 36.00 | 11.2 | 14.110 | | | |
| Sprinkler | 481 | 27.97 | 21.00 | 8 | 12.227 | | | |
| Sprinkler | 482 | 29.54 | 21.00 | 8 | 13.633 | | | |
| Sprinkler | 483 | 42.09 | 36.00 | 11.2 | 14.124 | | | |
| Sprinkler | 484 | 41.53 | 36.00 | 11.2 | 13.749 | | | |
| Sprinkler | 486 | 29.84 | 21.00 | 8 | 13.916 | | | |
| Sprinkler | 487 | 27.34 | 21.00 | 8 | 11.680 | | | |
| Sprinkler | 488 | 28.87 | 21.00 | 8 | 13.027 | | | |
| Sprinkler | 489 | 41.66 | 36.00 | 11.2 | 13.835 | | | |
| Sprinkler | 490 | 41.38 | 36.00 | 11.2 | 13.649 | | | |
| Sprinkler | 493 | 39.48 | 36.00 | 11.2 | 12.428 | | | |
| Sprinkler | 494 | 36.15 | 36.00 | 11.2 | 10.419 | | | |
| Sprinkler | 495 | 38.19 | 36.00 | 11.2 | 11.629 | | | |
| Sprinkler | 496 | 41.44 | 36.00 | 11.2 | 13.690 | | | |
| Sprinkler | 499 | 39.32 | 36.00 | 11.2 | 12.326 | | | |
| ⇒ Sprinkler | 500 | 36.00 | 36.00 | 11.2 | 10.332 | | | |
| Sprinkler | 501 | 38.04 | 36.00 | 11.2 | 11.533 | | | |
| Sprinkler | 502 | 41.38 | 36.00 | 11.2 | 13.648 | | | |

⇒ Most Demanding Sprinkler Data

| Supply Analysis | | | | | | | |
|------------------------|--------------|--------------|----------------|--------------|-----------------|----------------------|-------------------------|
| Node | Name | Static (psi) | Residual (psi) | @ Flow (gpm) | Available (psi) | @ Total Demand (gpm) | Required Pressure (psi) |
| 1 | Water Supply | 94.000 | 71.000 | 1917.00 | 80.902 | 1413.99 | 63.317 |

| Node Analysis | | | | | |
|----------------------|------------------|-----------|------------------------|-------------------------|-------|
| Node Number | Elevation (Foot) | Node Type | Pressure at Node (psi) | Discharge at Node (gpm) | Notes |
| 1 | -4-0 | Supply | 63.317 | 1413.99 | |
| 3 | -4-0 | | 59.897 | 500.00 | |
| 469 | 8-10 | Sprinkler | 14.338 | 30.29 | |
| 470 | 8-10 | Sprinkler | 15.970 | 31.97 | |
| 471 | 8-10 | Sprinkler | 15.365 | 43.90 | |
| 472 | 8-10 | Sprinkler | 14.871 | 43.19 | |
| 475 | 8-10 | Sprinkler | 13.093 | 28.95 | |
| 476 | 8-10 | Sprinkler | 14.591 | 30.56 | |
| 477 | 8-10 | Sprinkler | 14.620 | 42.82 | |
| 478 | 8-10 | Sprinkler | 14.110 | 42.07 | |
| 481 | 8-10 | Sprinkler | 12.227 | 27.97 | |
| 482 | 8-10 | Sprinkler | 13.633 | 29.54 | |
| 483 | 8-10 | Sprinkler | 14.124 | 42.09 | |
| 484 | 8-10 | Sprinkler | 13.749 | 41.53 | |
| 486 | 8-10 | Sprinkler | 13.916 | 29.84 | |
| 487 | 8-10 | Sprinkler | 11.680 | 27.34 | |
| 488 | 8-10 | Sprinkler | 13.027 | 28.87 | |
| 489 | 8-10 | Sprinkler | 13.835 | 41.66 | |

| Node Number | Elevation (Foot) | Node Type | Pressure at Node (psi) | Discharge at Node (gpm) | Notes |
|-------------|------------------|-----------|------------------------|-------------------------|-------|
| 490 | 8-10 | Sprinkler | 13.649 | 41.38 | |
| 493 | 8-10 | Sprinkler | 12.428 | 39.48 | |
| 494 | 8-10 | Sprinkler | 10.419 | 36.15 | |
| 495 | 8-10 | Sprinkler | 11.629 | 38.19 | |
| 496 | 8-10 | Sprinkler | 13.690 | 41.44 | |
| 499 | 8-10 | Sprinkler | 12.326 | 39.32 | |
| 500 | 8-10 | Sprinkler | 10.332 | 36.00 | |
| 501 | 8-10 | Sprinkler | 11.533 | 38.04 | |
| 502 | 8-10 | Sprinkler | 13.648 | 41.38 | |
| 6 | 1-2 | Gauge | 57.413 | 0.00 | BOR |
| 37 | 1-7½ | | 57.208 | 0.00 | |
| 43 | 14-4½ | | 51.426 | 0.00 | |
| 67 | 16-3½ | | 46.261 | 0.00 | |
| 72 | 16-3½ | | 46.254 | 0.00 | |
| 177 | 9-7½ | | 15.621 | 0.00 | |
| 178 | 9-7½ | | 17.423 | 0.00 | |
| 179 | 9-7½ | | 18.248 | 0.00 | |
| 180 | 9-7½ | | 17.657 | 0.00 | |
| 185 | 9-7½ | | 14.246 | 0.00 | |
| 186 | 9-7½ | | 15.901 | 0.00 | |
| 187 | 9-7½ | | 17.358 | 0.00 | |
| 188 | 9-7½ | | 16.749 | 0.00 | |

| Node Number | Elevation (Foot) | Node Type | Pressure at Node (psi) | Discharge at Node (gpm) | Notes |
|-------------|------------------|-----------|------------------------|-------------------------|-------|
| 191 | 9-7½ | | 13.289 | 0.00 | |
| 192 | 9-7½ | | 14.842 | 0.00 | |
| 193 | 9-7½ | | 16.765 | 0.00 | |
| 194 | 9-7½ | | 16.317 | 0.00 | |
| 196 | 9-7½ | | 15.155 | 0.00 | |
| 197 | 9-7½ | | 12.684 | 0.00 | |
| 198 | 9-7½ | | 14.173 | 0.00 | |
| 199 | 9-7½ | | 16.420 | 0.00 | |
| 200 | 9-7½ | | 16.198 | 0.00 | |
| 205 | 9-7½ | | 14.737 | 0.00 | |
| 206 | 9-7½ | | 12.329 | 0.00 | |
| 207 | 9-7½ | | 13.780 | 0.00 | |
| 208 | 9-7½ | | 16.247 | 0.00 | |
| 212 | 9-7½ | | 14.615 | 0.00 | |
| 213 | 9-7½ | | 12.225 | 0.00 | |
| 214 | 9-7½ | | 13.665 | 0.00 | |
| 215 | 9-7½ | | 16.196 | 0.00 | |
| 231 | 9-7½ | | 18.438 | 0.00 | |
| 234 | 9-7½ | | 18.773 | 0.00 | |
| 236 | 9-7½ | | 31.088 | 0.00 | |
| 240 | 9-7½ | | 20.909 | 0.00 | |
| 244 | 9-7½ | | 21.008 | 0.00 | |

| Node Number | Elevation (Foot) | Node Type | Pressure at Node (psi) | Discharge at Node (gpm) | Notes |
|-------------|------------------|-----------|------------------------|-------------------------|-------|
| 247 | 9-7½ | | 20.255 | 0.00 | |

| Pipe Information | | | | | | | | | |
|------------------|---------------|----------|--------------------------|------------|----------------------|----------------|---------------------------------|--------------|--|
| Node 1 | Elev 1 (Foot) | K-Factor | Flow added this step (q) | Nominal ID | Fittings & Devices | Length (Foot) | C Factor | Total(Pt) | Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value. |
| Node 2 | Elev 2 (Foot) | | Total Flow (Q) | Actual ID | Equiv. Length (Foot) | Fitting (Foot) | Pf Friction Loss Per Unit (psi) | Elev(Pe) | |
| | | | | | | Total (Foot) | | Friction(Pf) | |
| 500 | 8-10 | 11.2 | 36.00 | 1 | (See Notes) | 0-9½ | 120 | 10.332 | ••••• Route 1 ••••• Sprinkler, PO(5-0) |
| 213 | 9-7½ | | 36.00 | 1.0490 | | 5-0 | 0.386056 | -0.337 | |
| | | | | | | 5-9½ | | 2.230 | |
| 213 | 9-7½ | | | 2 | | 9-0 | 120 | 12.225 | |
| 206 | 9-7½ | | 36.00 | 2.1570 | | 9-0 | 0.011534 | 0.104 | |
| | | | | | | | | | |
| 206 | 9-7½ | | 36.15 | 2 | | 8-6 | 120 | 12.329 | Flow (q) from Route 2 |
| 197 | 9-7½ | | 72.15 | 2.1570 | | 8-6 | 0.041741 | 0.355 | |
| | | | | | | | | | |
| 197 | 9-7½ | | 27.34 | 2 | | 8-0 | 120 | 12.684 | Flow (q) from Route 16 |
| 191 | 9-7½ | | 99.49 | 2.1570 | | 8-0 | 0.075634 | 0.605 | |
| | | | | | | | | | |
| 191 | 9-7½ | | 27.97 | 2 | | 8-0 | 120 | 13.289 | Flow (q) from Route 18 |
| 185 | 9-7½ | | 127.47 | 2.1570 | | 8-0 | 0.119616 | 0.957 | |
| | | | | | | | | | |
| 185 | 9-7½ | | 28.95 | 2 | | 7-10½ | 120 | 14.246 | Flow (q) from Route 20 |
| 177 | 9-7½ | | 156.41 | 2.1570 | | 7-10½ | 0.174669 | 1.376 | |
| | | | | | | | | | |
| 177 | 9-7½ | | 30.29 | 2 | (See Notes) | 0-8½ | 120 | 15.621 | Flow (q) from Route 23 PO(12-3½) |
| 234 | 9-7½ | | 186.71 | 2.1570 | | 12-3½ | 0.242354 | 3.152 | |
| | | | | | | 13-0 | | | |
| 234 | 9-7½ | | 108.65 | 2½ | | 10-0 | 120 | 18.773 | Flow (q) from Route 5 |
| 240 | 9-7½ | | 295.36 | 2.6350 | | 10-0 | 0.213594 | 2.136 | |
| | | | | | | | | | |
| 240 | 9-7½ | | 197.17 | 2½ | (See Notes) | 2-0½ | 120 | 20.909 | Flow (q) from Route 3 PO(16-5½) |
| 236 | 9-7½ | | 492.52 | 2.6350 | | 16-5½ | 0.550099 | 0.000 | |
| | | | | | | 18-6 | | 10.179 | |
| 236 | 9-7½ | | 421.46 | 4 | (See Notes) | 55-4 | 120 | 31.088 | Flow (q) from Route 7 3fE(8-11½), PO(26-4) |
| 72 | 16-3½ | | 913.99 | 4.2600 | | 53-2½ | 0.166405 | -2.894 | |
| | | | | | | 108-6½ | | 18.060 | |
| 72 | 16-3½ | | | 6 | | 33-5½ | 120 | 46.254 | |
| 67 | 16-3½ | | 72.98 | 6.3570 | | 33-5½ | 0.000221 | 0.000 | |
| | | | | | | | | 0.007 | |

Pipe Information

| Node 1 | Elev 1 (Foot) | K-Factor | Flow added this step (q) | Nominal ID | Fittings & Devices | Length (Foot) | C Factor | Total(Pt) | Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value. |
|--------|---------------|--------------|--------------------------|----------------|--------------------|---------------|----------------|---------------------------------|--|
| | Node 2 | | Elev 2 (Foot) | Total Flow (Q) | | Actual ID | Fitting (Foot) | Pf Friction Loss Per Unit (psi) | |
| | | Total (Foot) | | | Friction(Pf) | | | | |
| 67 | 16-3½ | | | 2½ | (See Notes) | 207-10½ | 120 | 46.261 | |
| 43 | 14-4½ | | 72.98 | 2.6350 | | 61-2½ | 0.016084 | 0.836 | |
| | | | | | | 269-1 | | 4.328 | |
| 43 | 14-4½ | | 841.00 | 6 | (See Notes) | 11-0 | 120 | 51.426 | Flow (q) from Route 26 f(-0.000), BFP |
| 37 | 1-7½ | | 913.99 | 6.3570 | | | 0.023689 | 5.522 | |
| | | | | | | 11-0 | | 0.261 | |
| 37 | 1-7½ | | | 8 | (See Notes) | 0-0 | 140 | 57.208 | BOR |
| 6 | 1-2 | | 913.99 | 8.3900 | | | 0.004611 | 0.204 | |
| | | | | | | 0-0 | | 0.000 | |
| 6 | 1-2 | | | 8 | (See Notes) | 22-5 | 140 | 57.413 | E(30-6½), FN |
| 3 | -4-0 | | 913.99 | 8.3900 | | 30-6½ | 0.004611 | 2.240 | |
| | | | | | | 52-11½ | | 0.244 | |
| 3 | -4-0 | | 500.00 | 8 | (See Notes) | 300-4 | 140 | 59.897 | E(30-6½), S |
| 1 | -4-0 | | 1413.99 | 8.3900 | | 30-6½ | 0.010337 | | |
| | | | | | | 330-10½ | | 3.420 | |
| | | | 0.00 | | | | | 63.317 | Hose Allowance At Source |
| 1 | | | 1413.99 | | | | | | Total(Pt) Route 1 |
| 494 | 8-10 | 11.2 | 36.15 | 1 | (See Notes) | 0-9½ | 120 | 10.419 | ••••• Route 2 ••••• Sprinkler, PO(5-0) |
| 206 | 9-7½ | | 36.15 | 1.0490 | | 5-0 | 0.389046 | -0.337 | |
| | | | | | | 5-9½ | | 2.248 | |
| | | | | | | | | 12.329 | Total(Pt) Route 2 |
| 501 | 8-10 | 11.2 | 38.04 | 1 | (See Notes) | 0-9½ | 120 | 11.533 | ••••• Route 3 ••••• Sprinkler, PO(5-0) |
| 214 | 9-7½ | | 38.04 | 1.0490 | | 5-0 | 0.427382 | -0.337 | |
| | | | | | | 5-9½ | | 2.469 | |
| 214 | 9-7½ | | | 2 | | 9-0 | 120 | 13.665 | |
| 207 | 9-7½ | | 38.04 | 2.1570 | | 9-0 | 0.012769 | 0.115 | |
| 207 | 9-7½ | | 38.19 | 2 | | 8-6 | | 120 | 13.780 |
| 198 | 9-7½ | | 76.23 | 2.1570 | | 8-6 | 0.046208 | 0.393 | |
| 198 | 9-7½ | | 28.87 | 2 | | 8-0 | | 120 | 14.173 |
| 192 | 9-7½ | | 105.10 | 2.1570 | | 8-0 | 0.083711 | 0.670 | |

Pipe Information

| Node 1 | Elev 1 (Foot) | K-Factor | Flow added this step (q) | Nominal ID | Fittings & Devices | Length (Foot) | C Factor | Total(Pt) | Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value. |
|--------------|---------------|--------------|--------------------------|----------------|--------------------|----------------------|----------------|---------------------------------|--|
| | Node 2 | | Elev 2 (Foot) | Total Flow (Q) | Actual ID | Equiv. Length (Foot) | Fitting (Foot) | Pf Friction Loss Per Unit (psi) | |
| Total (Foot) | | Friction(Pf) | | | | | | | |
| 192 | 9-7½ | | 29.54 | 2 | | 8-0 | 120 | 14.842 | |
| 186 | 9-7½ | | 134.64 | 2.1570 | | 8-0 | 0.132365 | 1.059 | |
| 186 | 9-7½ | | 30.56 | 2 | | 7-10½ | 120 | 15.901 | Flow (q) from Route 24 |
| 178 | 9-7½ | | 165.20 | 2.1570 | | 7-10½ | 0.193247 | 1.522 | |
| 178 | 9-7½ | | 31.97 | 2 | (See Notes) | 0-8½ | 120 | 17.423 | Flow (q) from Route 25 PO(12-3½) |
| 240 | 9-7½ | | 197.17 | 2.1570 | | 12-3½ | 0.268071 | 3.486 | |
| | | | | | | 13-0 | | | |
| | | | | | | | | 20.909 | Total(Pt) Route 3 |
| 495 | 8-10 | 11.2 | 38.19 | 1 | (See Notes) | 0-9½ | 120 | 11.629 | Route 4 Sprinkler, PO(5-0) |
| 207 | 9-7½ | | 38.19 | 1.0490 | | 5-0 | 0.430670 | -0.337 | |
| | | | | | | 5-9½ | | 2.488 | |
| | | | | | | | | 13.780 | Total(Pt) Route 4 |
| 499 | 8-10 | 11.2 | 39.32 | 1 | (See Notes) | 0-9½ | 120 | 12.326 | Route 5 Sprinkler, PO(5-0) |
| 212 | 9-7½ | | 39.32 | 1.0490 | | 5-0 | 0.454510 | -0.337 | |
| | | | | | | 5-9½ | | 2.626 | |
| 212 | 9-7½ | | | 2 | | 9-0 | 120 | 14.615 | |
| 205 | 9-7½ | | 39.32 | 2.1570 | | 9-0 | 0.013579 | 0.122 | |
| 205 | 9-7½ | | 39.48 | 2 | | 8-6 | 120 | 14.737 | Flow (q) from Route 6 |
| 196 | 9-7½ | | 78.81 | 2.1570 | | 8-6 | 0.049140 | 0.418 | |
| 196 | 9-7½ | | 29.84 | 2 | (See Notes) | 24-7 | 120 | 15.155 | Flow (q) from Route 22 PO(12-3½) |
| 231 | 9-7½ | | 108.65 | 2.1570 | | 12-3½ | 0.089012 | 3.283 | |
| | | | | | | 36-10½ | | | |
| 231 | 9-7½ | | | 2½ | | 10-0 | 120 | 18.438 | |
| 234 | 9-7½ | | 108.65 | 2.6350 | | 10-0 | 0.033581 | 0.336 | |
| | | | | | | | | 18.773 | Total(Pt) Route 5 |
| 493 | 8-10 | 11.2 | 39.48 | 1 | (See Notes) | 0-9½ | 120 | 12.428 | Route 6 Sprinkler, PO(5-0) |
| 205 | 9-7½ | | 39.48 | 1.0490 | | 5-0 | 0.457991 | -0.337 | |
| | | | | | | 5-9½ | | 2.646 | |

Pipe Information

| Node 1 | Elev 1 (Foot) | K-Factor | Flow added this step (q) | Nominal ID | Fittings & Devices | Length (Foot) | C Factor | Total(Pt) | Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value. | |
|--------|---------------|----------|--------------------------|------------|--------------------|---------------|----------|-----------|--|--|
| | | | | | | | | | | Node 2 |
| | | | | | | | | 14.737 | | |
| 502 | 8-10 | 11.2 | 41.38 | 1 | (See Notes) | 0-9½ | 120 | 13.648 | | ***** Route 7 ***** Sprinkler, PO(5-0) |
| 215 | 9-7½ | | 41.38 | 1.0490 | | 5-0 | 0.499425 | -0.337 | | |
| | | | | | | 5-9½ | | 2.885 | | |
| 215 | 9-7½ | | | 2½ | | 9-0 | 120 | 16.196 | Flow (q) from Route 9 | |
| 208 | 9-7½ | | 41.38 | 2.6350 | | 9-0 | 0.005629 | 0.051 | | |
| | | | | | | | | | | |
| 208 | 9-7½ | | 41.44 | 2½ | | 8-6 | 120 | 16.247 | Flow (q) from Route 11 | |
| 199 | 9-7½ | | 82.82 | 2.6350 | | 8-6 | 0.020322 | 0.173 | | |
| | | | | | | | | | | |
| 199 | 9-7½ | | 41.66 | 2½ | | 8-0 | 120 | 16.420 | Flow (q) from Route 13 | |
| 193 | 9-7½ | | 124.48 | 2.6350 | | 8-0 | 0.043188 | 0.346 | | |
| | | | | | | | | | | |
| 193 | 9-7½ | | 42.09 | 2½ | | 8-0 | 120 | 16.765 | Flow (q) from Route 14 | |
| 187 | 9-7½ | | 166.57 | 2.6350 | | 8-0 | 0.074028 | 0.592 | | |
| | | | | | | | | | | |
| 187 | 9-7½ | | 42.82 | 2½ | | 7-10½ | 120 | 17.358 | Flow (q) from Route 17 | |
| 179 | 9-7½ | | 209.39 | 2.6350 | | 7-10½ | 0.113038 | 0.890 | | |
| | | | | | | | | | | |
| 179 | 9-7½ | | 43.90 | 2½ | (See Notes) | 0-8½ | 120 | 18.248 | Flow (q) from Route 8 PO(16-5½) | |
| 244 | 9-7½ | | 253.29 | 2.6350 | | 16-5½ | 0.160752 | 2.761 | | |
| | | | | | | 17-2 | | | | |
| 244 | 9-7½ | | 168.17 | 2½ | (See Notes) | 7-11½ | 120 | 21.008 | Flow (q) from Route 8 PO(16-5½) | |
| 236 | 9-7½ | | 421.46 | 2.6350 | | 16-5½ | 0.412340 | 0.000 | | |
| | | | | | | 24-5½ | | 10.080 | | |
| | | | | | | | | 31.088 | Total(Pt) Route 7 | |
| 490 | 8-10 | 11.2 | 41.38 | 1 | (See Notes) | 0-9½ | 120 | 13.649 | ***** Route 8 ***** Sprinkler, PO(5-0) | |
| 200 | 9-7½ | | 41.38 | 1.0490 | | 5-0 | 0.499465 | -0.337 | | |
| | | | | | | 5-9½ | | 2.886 | | |
| 200 | 9-7½ | | | 2 | | 8-0 | 120 | 16.198 | Flow (q) from Route 8 PO(16-5½) | |
| 194 | 9-7½ | | 41.38 | 2.1570 | | 8-0 | 0.014922 | 0.119 | | |
| | | | | | | | | | | |

Pipe Information

| Node 1 | Elev 1 (Foot) | K-Factor | Flow added this step (q) | Nominal ID | Fittings & Devices | Length (Foot) | C Factor | Total(Pt) | Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value. |
|--------------|---------------|----------|--------------------------|------------|--------------------|---------------|----------|-----------|--|
| | | | | | | | | | |
| Total (Foot) | Friction(Pf) | | | | | | | | |
| | | 194 | 9-7½ | | 41.53 | 2 | | 8-0 | |
| 188 | 9-7½ | | 82.91 | 2.1570 | | 8-0 | 0.053976 | 0.432 | |
| 188 | 9-7½ | | 42.07 | 2 | | 7-10½ | 120 | 16.749 | Flow (q) from Route 12 |
| 180 | 9-7½ | | 124.98 | 2.1570 | | 7-10½ | 0.115333 | 0.908 | |
| 180 | 9-7½ | | 43.19 | 2 | (See Notes) | 0-8½ | 120 | 17.657 | Flow (q) from Route 15 PO(12-3½) |
| 247 | 9-7½ | | 168.17 | 2.1570 | | 12-3½ | 0.199725 | | |
| | | | | | | 13-0 | | 2.598 | |
| 247 | 9-7½ | | | 2½ | | 10-0 | 120 | 20.255 | |
| 244 | 9-7½ | | 168.17 | 2.6350 | | 10-0 | 0.075350 | 0.753 | |
| | | | | | | | | 21.008 | Total(Pt) Route 8 |
| 496 | 8-10 | 11.2 | 41.44 | 1 | (See Notes) | 0-9½ | 120 | 13.690 | ***** Route 9 ***** Sprinkler, PO(5-0) |
| | | | | | | 5-0 | 0.500859 | -0.337 | |
| 208 | 9-7½ | | 41.44 | 1.0490 | | 5-9½ | | 2.894 | |
| | | | | | | | | 16.247 | Total(Pt) Route 9 |
| 484 | 8-10 | 11.2 | 41.53 | 1 | (See Notes) | 0-9½ | 120 | 13.749 | ***** Route 10 ***** Sprinkler, PO(5-0) |
| | | | | | | 5-0 | 0.502844 | -0.337 | |
| 194 | 9-7½ | | 41.53 | 1.0490 | | 5-9½ | | 2.905 | |
| | | | | | | | | 16.317 | Total(Pt) Route 10 |
| 489 | 8-10 | 11.2 | 41.66 | 1 | (See Notes) | 0-9½ | 120 | 13.835 | ***** Route 11 ***** Sprinkler, PO(5-0) |
| | | | | | | 5-0 | 0.505747 | -0.337 | |
| 199 | 9-7½ | | 41.66 | 1.0490 | | 5-9½ | | 2.922 | |
| | | | | | | | | 16.420 | Total(Pt) Route 11 |
| 478 | 8-10 | 11.2 | 42.07 | 1 | (See Notes) | 0-9½ | 120 | 14.110 | ***** Route 12 ***** Sprinkler, PO(5-0) |
| | | | | | | 5-0 | 0.515054 | -0.337 | |
| 188 | 9-7½ | | 42.07 | 1.0490 | | 5-9½ | | 2.976 | |
| | | | | | | | | 16.749 | Total(Pt) Route 12 |
| 483 | 8-10 | 11.2 | 42.09 | 1 | (See Notes) | 0-9½ | 120 | 14.124 | ***** Route 13 ***** Sprinkler, PO(5-0) |
| | | | | | | 5-0 | 0.515514 | -0.337 | |
| 193 | 9-7½ | | 42.09 | 1.0490 | | 5-9½ | | 2.978 | |
| | | | | | | | | 16.765 | Total(Pt) Route 13 |

Pipe Information

| Node 1 | Elev 1 (Foot) | K-Factor | Flow added this step (q) | Nominal ID | Fittings & Devices | Length (Foot) | C Factor | Total(Pt) | Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value. |
|--------------|---------------|----------|--------------------------|------------|--------------------|---------------|-------------|-----------|--|
| | | | | | | | | | |
| Total (Foot) | Friction(Pf) | | | | | | | | |
| | | 477 | 8-10 | 11.2 | 42.82 | 1 | (See Notes) | 0-9½ | |
| 187 | 9-7½ | | 42.82 | 1.0490 | | 5-0 | 0.532227 | -0.337 | |
| | | | | | | 5-9½ | | 3.075 | |
| | | | | | | | | 17.358 | Total(Pt) Route 14 |
| 472 | 8-10 | 11.2 | 43.19 | 1 | (See Notes) | 0-9½ | 120 | 14.871 | ***** Route 15 ***** Sprinkler, PO(5-0) |
| 180 | 9-7½ | | 43.19 | 1.0490 | | 5-0 | 0.540672 | -0.337 | |
| | | | | | | 5-9½ | | 3.124 | |
| | | | | | | | | 17.657 | |
| 487 | 8-10 | 8 | 27.34 | 1 | (See Notes) | 0-9½ | 120 | 11.680 | ***** Route 16 ***** Sprinkler, PO(5-0) |
| 197 | 9-7½ | | 27.34 | 1.0490 | | 5-0 | 0.232055 | -0.337 | |
| | | | | | | 5-9½ | | 1.341 | |
| | | | | | | | | 12.684 | |
| 471 | 8-10 | 11.2 | 43.90 | 1 | (See Notes) | 0-9½ | 120 | 15.365 | ***** Route 17 ***** Sprinkler, PO(5-0) |
| 179 | 9-7½ | | 43.90 | 1.0490 | | 5-0 | 0.557281 | -0.337 | |
| | | | | | | 5-9½ | | 3.220 | |
| | | | | | | | | 18.248 | |
| 481 | 8-10 | 8 | 27.97 | 1 | (See Notes) | 0-9½ | 120 | 12.227 | ***** Route 18 ***** Sprinkler, PO(5-0) |
| 191 | 9-7½ | | 27.97 | 1.0490 | | 5-0 | 0.242091 | -0.337 | |
| | | | | | | 5-9½ | | 1.399 | |
| | | | | | | | | 13.289 | |
| 488 | 8-10 | 8 | 28.87 | 1 | (See Notes) | 0-9½ | 120 | 13.027 | ***** Route 19 ***** Sprinkler, PO(5-0) |
| 198 | 9-7½ | | 28.87 | 1.0490 | | 5-0 | 0.256691 | -0.337 | |
| | | | | | | 5-9½ | | 1.483 | |
| | | | | | | | | 14.173 | |
| 475 | 8-10 | 8 | 28.95 | 1 | (See Notes) | 0-9½ | 120 | 13.093 | ***** Route 20 ***** Sprinkler, PO(5-0) |
| 185 | 9-7½ | | 28.95 | 1.0490 | | 5-0 | 0.257902 | -0.337 | |
| | | | | | | 5-9½ | | 1.490 | |
| | | | | | | | | 14.246 | |
| 482 | 8-10 | 8 | 29.54 | 1 | (See Notes) | 0-9½ | 120 | 13.633 | ***** Route 21 ***** Sprinkler, PO(5-0) |
| 192 | 9-7½ | | 29.54 | 1.0490 | | 5-0 | 0.267718 | -0.337 | |
| | | | | | | 5-9½ | | 1.547 | |
| | | | | | | | | 14.842 | |

Pipe Information

| Node 1 | Elev 1 (Foot) | K-Factor | Flow added this step (q) | Nominal ID | Fittings & Devices | Length (Foot) | C Factor | Total(Pt) | Notes | |
|--------|---------------|----------|--------------------------|------------|--------------------|---------------|----------|-----------|--------------------|--------|
| | | | | | | | | | | Node 2 |
| 486 | 8-10 | 8 | 29.84 | 1 | (See Notes) | 0-9½ | 120 | 13.916 | | |
| 196 | 9-7½ | | 29.84 | 1.0490 | | 5-0 | 0.272854 | -0.337 | | |
| | | | | | | 5-9½ | | 1.576 | | |
| | | | | | | | | 15.155 | Total(Pt) Route 22 | |
| 469 | 8-10 | 8 | 30.29 | 1 | (See Notes) | 0-9½ | 120 | 14.338 | | |
| 177 | 9-7½ | | 30.29 | 1.0490 | | 5-0 | 0.280507 | -0.337 | | |
| | | | | | | 5-9½ | | 1.621 | | |
| | | | | | | | | 15.621 | Total(Pt) Route 23 | |
| 476 | 8-10 | 8 | 30.56 | 1 | (See Notes) | 0-9½ | 120 | 14.591 | | |
| 186 | 9-7½ | | 30.56 | 1.0490 | | 5-0 | 0.285086 | -0.337 | | |
| | | | | | | 5-9½ | | 1.647 | | |
| | | | | | | | | 15.901 | Total(Pt) Route 24 | |
| 470 | 8-10 | 8 | 31.97 | 1 | (See Notes) | 0-9½ | 120 | 15.970 | | |
| 178 | 9-7½ | | 31.97 | 1.0490 | | 5-0 | 0.309912 | -0.337 | | |
| | | | | | | 5-9½ | | 1.791 | | |
| | | | | | | | | 17.423 | Total(Pt) Route 25 | |
| 72 | 16-3½ | | 72.98 | 6 | (See Notes) | 175-9 | 120 | 46.254 | | |
| 43 | 14-4½ | | 841.00 | 6.3570 | | 37-8½ | 0.020309 | 0.837 | | |
| | | | | | | 213-5½ | | 4.335 | | |
| | | | | | | | | 51.426 | Total(Pt) Route 26 | |

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

C Value Multiplier

$$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}} \right)^{4.87} = \text{Factor}$$

| | | | | |
|--------------------|-------|------|------|------|
| Value Of C | 100 | 130 | 140 | 150 |
| Multiplying Factor | 0.713 | 1.16 | 1.33 | 1.51 |

Fittings Legend

| | | |
|--------------------------------|---------------------------|----------------------------|
| ALV Alarm Valve | AngV Angle Valve | b Bushing |
| BaIV Ball Valve | BFP Backflow Preventer | BV Butterfly Valve |
| C Cross Flow Turn 90° | cplg Coupling | Cr Cross Run |
| CV Check Valve | DelV Deluge Valve | DPV Dry Pipe Valve |
| E 90° Elbow | EE 45° Elbow | Ee1 11¼° Elbow |
| Ee2 22½° Elbow | f Flow Device | fd Flex Drop |
| FDC Fire Department Connection | fE 90° FireLock(TM) Elbow | fEE 45° FireLock(TM) Elbow |
| flg Flange | FN Floating Node | fT FireLock(TM) Tee |
| g Gauge | GloV Globe Valve | GV Gate Valve |
| Ho Hose | Hose Hose | HV Hose Valve |
| Hyd Hydrant | LtE Long Turn Elbow | mecT Mechanical Tee |
| Noz Nozzle | P1 Pump In | P2 Pump Out |
| PIV Post Indicating Valve | PO Pipe Outlet | PrV Pressure Relief Valve |
| PRV Pressure Reducing Valve | red Reducer/Adapter | S Supply |
| sCV Swing Check Valve | SFx Seismic Flex | Spr Sprinkler |
| St Strainer | T Tee Flow Turn 90° | Tr Tee Run |
| U Union | WirF Wirsbo | WMV Water Meter Valve |
| Z Cap | | |

Hydraulic Calculations

for

Project Name: Napa Auto Parts: (1)

Location: 2321 NE Independence Ave., Lee's Summit, MO 64064,

Drawing Name: Napa Auto Parts

Calculation Date: 10/23/2025

Design

Remote Area Number: 3

Occupancy Classification: Rack Storage

Density 0.10gpm/ft²

Area of Application: 1500ft² (Actual 247ft²)

Coverage per Sprinkler: 64ft²

Type of sprinklers calculated: Pendent

No. of sprinklers calculated: 6

No. of nozzles calculated: 0

In-rack Demand: N/A gpm at Node: N/A

Hose Streams: 0.0 gpm at Node: 1 Type: Allowance at Source

Total Water Required (including Hose Streams where applicable):

From Water Supply at Node 1: 711.88 @ 60.787 (Safety Margin = 29.533)

Type of System: Wet

Volume of Dry/PreAction/Antifreeze/OtherAgent System: N/A

Name of Contractor:

Address:

Phone Number:

Name of designer: BCP

Authority Having Jurisdiction: :

Notes:

Automatic peaking results

Left: N/A

Right: N/A

Summary Notes:



Summary Of Outflowing Devices

Job Number: 1
Report Description: Rack Storage (3)

| Device | | Actual Flow (gpm) | Minimum Flow (gpm) | K-Factor (K) | Pressure (psi) | | | |
|--------------------|------------|-------------------|--------------------|--------------|----------------|--|--|--|
| Floating Node | 3 | 500.00 | 500.00 | 0 | 59.826 | | | |
| Sprinkler | 301 | 31.65 | 30.98 | 8 | 15.655 | | | |
| Sprinkler | 311 | 34.02 | 30.98 | 8 | 18.086 | | | |
| Sprinkler | 317 | 40.11 | 30.98 | 8 | 25.132 | | | |
| Sprinkler | 319 | 41.81 | 30.98 | 8 | 27.308 | | | |
| Sprinkler | 325 | 33.31 | 30.98 | 8 | 17.337 | | | |
| ⇒ Sprinkler | 330 | 30.98 | 30.98 | 8 | 15.000 | | | |

⇒ Most Demanding Sprinkler Data

Supply Analysis

| Node | Name | Static (psi) | Residual (psi) | @ | Flow (gpm) | Available (psi) | @ | Total Demand (gpm) | Required Pressure (psi) |
|------|--------------|--------------|----------------|---|------------|-----------------|---|--------------------|-------------------------|
| 1 | Water Supply | 94.000 | 71.000 | | 1917.00 | 90.320 | | 711.88 | 60.787 |

Node Analysis

| Node Number | Elevation (Foot) | Node Type | Pressure at Node (psi) | Discharge at Node (gpm) | Notes |
|-------------|------------------|-----------|------------------------|-------------------------|-------|
| 1 | -4-0 | Supply | 60.787 | 711.88 | |
| 3 | -4-0 | | 59.826 | 500.00 | |
| 301 | 7-6½ | Sprinkler | 15.655 | 31.65 | |
| 311 | 7-6½ | Sprinkler | 18.086 | 34.02 | |
| 317 | 7-6½ | Sprinkler | 25.132 | 40.11 | |
| 319 | 7-6½ | Sprinkler | 27.308 | 41.81 | |
| 325 | 7-6½ | Sprinkler | 17.337 | 33.31 | |
| 330 | 7-6½ | Sprinkler | 15.000 | 30.98 | |
| 6 | 1-2 | Gauge | 57.570 | 0.00 | BOR |
| 37 | 1-7½ | | 57.366 | 0.00 | |
| 43 | 14-4½ | | 51.826 | 0.00 | |
| 67 | 16-3½ | | 50.700 | 0.00 | |
| 72 | 16-3½ | | 50.699 | 0.00 | |
| 114 | 7-6½ | | 30.133 | 0.00 | |
| 116 | 7-6½ | | 30.234 | 0.00 | |
| 129 | 18-0 | | 48.855 | 0.00 | |

Pipe Information

| Node 1 | Elev 1 (Foot) | K-Factor | Flow added this step (q) | Nominal ID | Fittings & Devices | Length (Foot) | C Factor | Total(Pt) | Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value. |
|--------|---------------|--------------|--------------------------|----------------|--------------------|---------------|----------------|---------------------------------|--|
| | Node 2 | | Elev 2 (Foot) | Total Flow (Q) | | Actual ID | Fitting (Foot) | Pf Friction Loss Per Unit (psi) | |
| | | Total (Foot) | Friction(Pf) | | | | | | |
| 330 | 7-6½ | 8 | 30.98 | 1 | (See Notes) | 8-0 | 120 | 15.000 | |
| 325 | 7-6½ | | 30.98 | 1.0490 | | 8-0 | 0.292467 | 2.337 | |
| 325 | 7-6½ | 8 | 33.31 | 1 | (See Notes) | 6-5 | 120 | 17.337 | Sprinkler, PO(5-0) |
| 116 | 7-6½ | | 64.29 | 1.0490 | | 5-0 | 1.128733 | 12.897 | |
| | | | | | 11-5 | | | | |
| 116 | 7-6½ | | 105.78 + 41.81 | 2 | (See Notes) | 41-9 | 120 | 30.234 | Flow (q) from Route 2 and 3 5fE(4-3½), T(12-3½) |
| | | | | | | 33-10 | 0.306247 | -4.534 | |
| 129 | 18-0 | | 211.88 | 2.1570 | 75-7½ | | | 23.156 | |
| 129 | 18-0 | | | 4 | (See Notes) | 20-6½ | 120 | 48.855 | 2PO(26-4), C(26-4) |
| | | | | | | 79-0 | 0.011135 | 0.735 | |
| 72 | 16-3½ | | 211.88 | 4.2600 | 99-6½ | | | 1.108 | |
| 72 | 16-3½ | | | 6 | | 33-5½ | 120 | 50.699 | |
| | | | | | | | 0.000015 | 0.000 | |
| 67 | 16-3½ | | 16.92 | 6.3570 | 33-5½ | | | 0.000 | |
| 67 | 16-3½ | | | 2½ | (See Notes) | 207-10½ | 120 | 50.700 | PO(16-5½) 2PO(16-5½), 2fE(5-10½) |
| | | | | | | 61-2½ | 0.001076 | 0.836 | |
| 43 | 14-4½ | | 16.92 | 2.6350 | 269-1 | | | 0.290 | |
| 43 | 14-4½ | | 194.96 | 6 | (See Notes) | 11-0 | 120 | 51.826 | Flow (q) from Route 4 f(-0.000), BFP |
| | | | | | | | 0.001585 | 5.522 | |
| 37 | 1-7½ | | 211.88 | 6.3570 | 11-0 | | | 0.017 | |
| 37 | 1-7½ | | | 8 | (See Notes) | 0-0 | 140 | 57.366 | BOR |
| | | | | | | | 0.000309 | 0.204 | |
| 6 | 1-2 | | 211.88 | 8.3900 | 0-0 | | | 0.000 | |
| 6 | 1-2 | | | 8 | (See Notes) | 22-5 | 140 | 57.570 | E(30-6½), FN |
| | | | | | | 30-6½ | 0.000309 | 2.240 | |
| 3 | -4-0 | | 211.88 | 8.3900 | 52-11½ | | | 0.016 | |
| 3 | -4-0 | | 500.00 | 8 | (See Notes) | 300-4 | 140 | 59.826 | E(30-6½), S |
| | | | | | | 30-6½ | 0.002904 | | |
| 1 | -4-0 | | 711.88 | 8.3900 | 330-10½ | | | 0.961 | |
| | | | 0.00 | | | | | 60.787 | Hose Allowance At Source |
| 1 | | | 711.88 | | | | | | Total(Pt) Route 1 |

Pipe Information

| Node 1 | Elev 1 (Foot) | K-Factor | Flow added this step (q) | Nominal ID | Fittings & Devices | Length (Foot) | C Factor | Total(Pt) | Notes Fitting/Device (Equivalent Length) Fixed Pressure Losses, when applicable, are added directly to (Pf) and shown as a negative value. | |
|--------|---------------|----------|--------------------------|------------|--------------------|---------------|----------|-----------|--|-------------------|
| | | | | | | | | | | Node 2 |
| 301 | 7-6½ | 8 | 31.65 | 1 | (See Notes) | 8-0 | 120 | 15.655 | | |
| 311 | 7-6½ | | 31.65 | 1.0490 | | 8-0 | 0.304263 | 2.431 | | |
| 311 | 7-6½ | 8 | 34.02 | 1 | (See Notes) | 6-0 | 120 | 18.086 | Sprinkler | |
| 317 | 7-6½ | | 65.68 | 1.0490 | | 6-0 | 1.174013 | 7.046 | | |
| 317 | 7-6½ | 8 | 40.11 | 1¼ | (See Notes) | 0-10 | 120 | 25.132 | Sprinkler, PO(6-0) | |
| 116 | 7-6½ | | 105.78 | 1.3800 | | 6-0 | 0.745756 | | | |
| | | | | | | 6-10 | | | | 5.102 |
| | | | | | | | | 30.234 | Total(Pt) Route 2 | |
| 319 | 7-6½ | 8 | 41.81 | 1 | (See Notes) | 0-6½ | 120 | 27.308 | ••••• Route 3 ••••• Sprinkler, PO(5-0) | |
| 114 | 7-6½ | | 41.81 | 1.0490 | | 5-0 | 0.509049 | | | |
| | | | | | | 5-6½ | | | | 2.825 |
| 114 | 7-6½ | | | 2 | | 6-8 | 120 | 30.133 | | |
| 116 | 7-6½ | | 41.81 | 2.1570 | | 6-8 | 0.015208 | | | |
| | | | | | | | | | | 0.101 |
| | | | | | | | | 30.234 | Total(Pt) Route 3 | |
| 72 | 16-3½ | | 16.92 | 6 | (See Notes) | 175-9 | 120 | 50.699 | ••••• Route 4 ••••• Flow (q) from Route 1 3fE(12-7) | |
| 43 | 14-4½ | | 194.96 | 6.3570 | | 37-8½ | 0.001359 | 0.837 | | |
| | | | | | | 213-5½ | | | | 0.290 |
| | | | | | | | | 51.826 | | Total(Pt) Route 4 |

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

C Value Multiplier

$$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}} \right)^{4.87} = \text{Factor}$$

| | | | | |
|--------------------|-------|------|------|------|
| Value Of C | 100 | 130 | 140 | 150 |
| Multiplying Factor | 0.713 | 1.16 | 1.33 | 1.51 |

Fittings Legend

| | | |
|--------------------------------|---------------------------|----------------------------|
| ALV Alarm Valve | AngV Angle Valve | b Bushing |
| BalV Ball Valve | BFP Backflow Preventer | BV Butterfly Valve |
| C Cross Flow Turn 90° | cplg Coupling | Cr Cross Run |
| CV Check Valve | DelV Deluge Valve | DPV Dry Pipe Valve |
| E 90° Elbow | EE 45° Elbow | Ee1 11¼° Elbow |
| Ee2 22½° Elbow | f Flow Device | fd Flex Drop |
| FDC Fire Department Connection | fE 90° FireLock(TM) Elbow | fEE 45° FireLock(TM) Elbow |
| flg Flange | FN Floating Node | fT FireLock(TM) Tee |
| g Gauge | GloV Globe Valve | GV Gate Valve |
| Ho Hose | Hose Hose | HV Hose Valve |
| Hyd Hydrant | LtE Long Turn Elbow | mecT Mechanical Tee |
| Noz Nozzle | P1 Pump In | P2 Pump Out |
| PIV Post Indicating Valve | PO Pipe Outlet | PrV Pressure Relief Valve |
| PRV Pressure Reducing Valve | red Reducer/Adapter | S Supply |
| sCV Swing Check Valve | SFx Seismic Flex | Spr Sprinkler |
| St Strainer | T Tee Flow Turn 90° | Tr Tee Run |
| U Union | WirF Wirsbo | WMV Water Meter Valve |
| Z Cap | | |