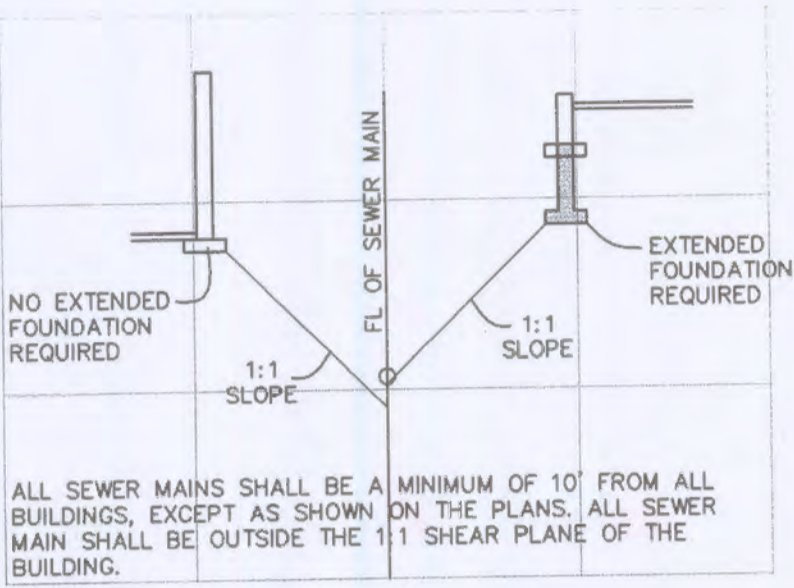


THE UNDERGROUND UTILITIES SHOWN HEREON WERE PLOTTED FROM AVAILABLE INFORMATION AND DO NOT NECESSARILY REFLECT THE ACTUAL EXISTENCE, NONEXISTENCE, SIZE, TYPE, NUMBER OR LOCATION OF THESE OR OTHER UTILITIES. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE ACTUAL LOCATION OF ALL UNDERGROUND UTILITIES, SHOWN OR NOT SHOWN, AND SAID UTILITIES SHALL BE LOCATED IN THE FIELD PRIOR TO ANY GRADING, EXCAVATION OR CONSTRUCTION OF IMPROVEMENTS. THESE PROVISIONS SHALL IN NO WAY ABSOLVE ANY PARTY FROM COMPLYING WITH THE UNDERGROUND FACILITY SAFETY AND DAMAGE PREVENTION ACT, CHAPTER 319, RSMo



TYPICAL ZONE OF INFLUENCE DETAIL
N.T.S.

15 YEAR HYDRAULICS

Rim-Hw = FREEBOARD TO TOP OF STRUCTURE

Storm Sewer Hydraulics - 15 Year 20 Minute

| LineNo. | LineID | LineSize | FlowRate | InvertDn | InvertUp | LineLength | LineSlope | VelAve | Grnd/RimElev Dn | Grnd/RimElev Up | HGLDn | HGLUp | Rim-Hw | CriticalDepth | EGLDn | EGLUp | EnergyLoss | CapacityFull | n-valuePipe |
|---------|-----------------|----------|----------|----------|----------|------------|-----------|--------|-----------------|-----------------|--------|--------|--------|---------------|--------|--------|------------|--------------|-------------|
| | | (in) | (cfs) | (ft) | (ft) | (ft) | (%) | (ft/s) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | |
| 30 | FES 01 - MH 02 | 36 | 46.63 | 599.62 | 599.75 | 13.04 | 1.00 | 6.62 | 603.03 | 608.50 | 602.62 | 602.67 | 5.14 | 2.22 | 603.30 | 603.36 | 0.06 | 66.60 | 0.013 |
| 34 | MH 02 - OS 03 | 30 | 28.05 | 599.95 | 600.18 | 23.40 | 0.98 | 5.71 | 608.50 | 608.02 | 603.36 | 603.47 | 4.05 | 1.80 | 603.86 | 603.97 | 0.11 | 40.66 | 0.013 |
| 31 | MH 02 - MH 04 | 27 | 18.58 | 599.95 | 601.73 | 254.95 | 0.70 | 4.67 | 608.50 | 614.30 | 603.36 | 604.27 | 9.85 | 1.51 | 603.70 | 604.61 | 0.92 | 25.87 | 0.013 |
| 32 | MH 04 - MH 05 | 27 | 18.58 | 601.93 | 602.70 | 76.66 | 1.00 | 4.86 | 614.30 | 615.90 | 604.45 | 604.66 | 11.03 | 1.51 | 604.79 | 605.06 | 0.26 | 31.03 | 0.013 |
| 33 | MH 05 - OS 06 | 27 | 18.58 | 602.90 | 604.33 | 143.24 | 1.00 | 5.80 | 615.90 | 608.92 | 604.87 | 605.84 | 3.08 | 1.51 | 605.54 | 606.51 | 0.00 | 30.94 | 0.013 |
| 1 | FES 07 - CI 08 | 30 | 27.24 | 603.00 | 603.19 | 37.33 | 0.51 | 5.55 | 605.88 | 612.85 | 606.86 | 607.02 | 5.59 | 1.78 | 607.34 | 607.50 | 0.17 | 29.26 | 0.013 |
| 2 | CI 08 - CI 09 | 30 | 25.21 | 603.39 | 603.57 | 35.00 | 0.51 | 5.14 | 612.85 | 612.85 | 607.26 | 607.40 | 5.25 | 1.71 | 607.67 | 607.81 | 0.13 | 29.41 | 0.013 |
| 3 | CI 09 - AI 10 | 30 | 22.64 | 603.76 | 604.37 | 122.50 | 0.50 | 4.61 | 612.85 | 612.50 | 607.60 | 607.98 | 3.78 | 1.62 | 607.93 | 608.31 | 0.37 | 28.94 | 0.013 |
| 4 | AI 10 - AI 11 | 24 | 16.46 | 604.57 | 604.75 | 36.03 | 0.50 | 5.24 | 612.50 | 613.20 | 608.72 | 608.91 | 3.65 | 1.46 | 609.15 | 609.34 | 0.19 | 15.99 | 0.013 |
| 5 | AI 11 - AI 12 | 24 | 10.80 | 604.95 | 605.92 | 193.77 | 0.50 | 3.44 | 613.20 | 619.00 | 609.55 | 609.99 | 8.75 | 1.18 | 609.73 | 610.18 | 0.44 | 16.00 | 0.013 |
| 6 | AI 12 - MH 13 | 24 | 10.08 | 606.12 | 606.57 | 89.34 | 0.50 | 3.21 | 619.00 | 621.10 | 610.25 | 610.43 | 10.51 | 1.14 | 610.41 | 610.59 | 0.18 | 16.05 | 0.013 |
| 7 | MH 13 - CI 14 | 24 | 10.08 | 606.77 | 607.26 | 98.08 | 0.50 | 3.21 | 621.10 | 616.73 | 610.59 | 610.79 | 5.76 | 1.14 | 610.75 | 610.95 | 0.20 | 15.99 | 0.013 |
| 8 | CI 14 - CI 15 | 24 | 8.73 | 607.46 | 607.81 | 35.00 | 1.00 | 2.78 | 616.73 | 616.73 | 610.97 | 611.03 | 5.62 | 1.05 | 611.09 | 611.15 | 0.05 | 22.62 | 0.013 |
| 9 | CI 15 - AI 16 | 18 | 4.52 | 608.01 | 609.30 | 128.69 | 1.00 | 2.56 | 616.73 | 615.90 | 611.11 | 611.34 | 4.40 | 0.82 | 611.21 | 611.45 | 0.24 | 10.51 | 0.013 |
| 10 | AI 16 - AI 17 | 18 | 2.85 | 609.50 | 612.50 | 300.00 | 1.00 | 2.79 | 615.90 | 617.60 | 611.50 | 613.14 | 4.46 | 0.64 | 611.54 | 613.38 | 0.88 | 10.50 | 0.013 |
| 17 | AI 10 - AI 18 | 18 | 5.36 | 604.57 | 605.81 | 123.97 | 1.00 | 3.03 | 612.50 | 613.90 | 608.72 | 609.04 | 4.64 | 0.89 | 608.86 | 609.19 | 0.32 | 10.50 | 0.013 |
| 18 | AI 18 - CI 19 | 15 | 4.09 | 606.01 | 607.44 | 142.50 | 1.00 | 3.33 | 613.90 | 614.60 | 609.26 | 609.83 | 4.68 | 0.82 | 609.43 | 610.00 | 0.57 | 6.47 | 0.013 |
| 19 | CI 19 - CI 20 | 15 | 2.38 | 607.64 | 607.99 | 35.00 | 1.00 | 1.94 | 614.60 | 614.60 | 609.92 | 609.96 | 4.58 | 0.62 | 609.97 | 610.02 | 0.05 | 6.46 | 0.013 |
| 11 | AI 11 - MH 21 | 15 | 4.38 | 604.95 | 606.15 | 120.00 | 1.00 | 3.57 | 613.20 | 618.40 | 609.55 | 610.10 | 8.16 | 0.85 | 609.75 | 610.30 | 0.55 | 6.46 | 0.013 |
| 12 | MH 21 - CI 22 | 15 | 4.38 | 606.35 | 606.64 | 29.08 | 1.00 | 3.57 | 618.40 | 617.67 | 610.24 | 610.37 | 7.09 | 0.85 | 610.44 | 610.57 | 0.13 | 6.45 | 0.013 |
| 13 | CI 22 - CI 23 | 15 | 3.36 | 606.84 | 607.19 | 35.08 | 1.00 | 2.74 | 617.67 | 617.67 | 610.58 | 610.67 | 6.87 | 0.74 | 610.69 | 610.79 | 0.10 | 6.45 | 0.013 |
| 14 | CI 23 - MH 24 | 15 | 2.29 | 607.39 | 607.69 | 30.07 | 1.00 | 1.87 | 617.67 | 617.50 | 610.80 | 610.83 | 6.63 | 0.60 | 610.85 | 610.89 | 0.04 | 6.45 | 0.013 |
| 15 | MH 24 - AI 24.1 | 15 | 2.29 | 607.89 | 608.74 | 85.00 | 1.00 | 1.87 | 617.50 | 616.90 | 610.87 | 610.98 | 5.88 | 0.60 | 610.93 | 611.03 | 0.11 | 6.46 | 0.013 |
| 16 | 24.1 - 24.2 | 15 | 1.35 | 608.94 | 609.75 | 80.60 | 1.00 | 1.10 | 616.90 | 616.65 | 611.02 | 611.05 | 5.58 | 0.46 | 611.04 | 611.07 | 0.04 | 6.47 | 0.013 |
| 23 | FES 25 - AI 26 | 18 | 4.64 | 607.00 | 607.18 | 36.76 | 0.49 | 4.46 | 608.79 | 611.90 | 607.83 | 608.07 | 3.69 | 0.83 | 608.16 | 608.35 | 0.19 | 7.35 | 0.013 |
| 24 | AI 26 - CI 27 | 15 | 3.93 | 607.38 | 608.00 | 123.30 | 0.50 | 4.20 | 611.90 | 613.50 | 608.27 | 608.89 | 4.47 | 0.80 | 608.55 | 609.17 | 0.62 | 4.58 | 0.013 |
| 25 | CI 27 - CI 28 | 12 | 1.79 | 608.20 | 608.55 | 35.00 | 1.00 | 3.23 | 613.50 | 613.50 | 609.03 | 609.12 | 4.38 | 0.57 | 609.26 | 609.35 | 0.00 | 3.56 | 0.013 |
| 20 | FES 29 - CI 30 | 18 | 4.75 | 607.00 | 607.42 | 83.49 | 0.50 | 4.49 | 608.79 | 613.50 | 607.84 | 608.32 | 4.88 | 0.84 | 608.18 | 608.61 | 0.43 | 7.45 | 0.013 |
| 21 | CI 30 - CI 31 | 18 | 3.83 | 607.62 | 607.97 | 35.00 | 1.00 | 3.71 | 613.50 | 613.50 | 608.62 | 608.72 | 4.78 | 0.75 | 608.91 | 609.01 | 0.00 | 10.50 | 0.013 |
| 22 | CI 31 - AI 32 | 12 | 1.00 | 608.17 | 609.42 | 124.62 | 1.00 | 2.73 | 613.50 | 613.40 | 608.72 | 609.84 | 3.56 | 0.42 | 608.88 | 610.00 | 0.00 | 3.57 | 0.013 |
| 26 | FES 33 - MH 34 | 15 | 3.65 | 607.00 | 607.28 | 28.50 | 0.98 | 4.47 | 608.52 | 614.70 | 607.81 | 608.05 | 6.65 | 0.77 | 608.14 | 608.38 | 0.00 | 6.40 | 0.013 |
| 27 | MH 34 - AI 35 | 15 | 3.65 | 607.48 | 609.14 | 166.00 | 1.00 | 5.01 | 614.70 | 613.40 | 608.15 | 609.91 | 3.49 | 0.77 | 608.48 | 610.24 | 0.00 | 6.46 | 0.013 |
| 28 | AI 35 - AI35.1 | 15 | 1.53 | 609.34 | 610.44 | 109.98 | 1.00 | 3.12 | 613.40 | 614.30 | 609.91 | 610.93 | 3.37 | 0.49 | 610.09 | 611.11 | 0.00 | 6.46 | 0.013 |
| 29 | FES 36 - CI 37 | 15 | 3.55 | 607.00 | 607.30 | 29.78 | 1.01 | 4.38 | 608.52 | 611.67 | 607.81 | 608.06 | 3.61 | 0.76 | 608.13 | 608.38 | 0.00 | 6.48 | 0.013 |

Storm Sewer Hydraulics - 15 Year 20 Minute - 100 Year Blocked High Water

| LineNo. | LineID | LineSize | FlowRate | InvertDn | InvertUp | LineLength | LineSlope | VelAve | Grnd/RimElev Dn | Grnd/RimElev Up | HGLDn | HGLUp | Rim-Hw | CriticalDepth | EGLDn | EGLUp | EnergyLoss | CapacityFull | n-valuePipe |
|---------|----------------|----------|----------|----------|----------|------------|-----------|--------|-----------------|-----------------|--------|--------|--------|---------------|--------|--------|------------|--------------|-------------|
| | | (in) | (cfs) | (ft) | (ft) | (ft) | (%) | (ft/s) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (ft) | (cfs) | |
| 30 | FES 01 - MH 02 | 36 | 46.63 | 599.62 | 599.75 | 13.04 | 1.00 | 6.62 | 603.03 | 608.50 | 602.62 | 602.67 | 5.14 | 2.22 | 603.30 | 603.36 | 0.06 | 66.60 | 0.013 |
| 34 | MH 02 - OS 03 | 30 | 28.05 | 599.95 | 600.18 | 23.40 | 0.98 | 5.71 | 608.50 | 608.02 | 603.36 | 603.47 | 4.05 | 1.80 | 603.86 | 603.97 | 0.11 | 40.66 | 0.013 |
| 31 | MH 02 - MH 04 | 27 | 18.58 | 599.95 | 601.73 | 254.95 | 0.70 | 4.67 | 608.50 | 614.30 | 603.36 | 604.27 | 9.85 | 1.51 | 603.70 | 604.61 | 0.92 | 25.87 | 0.013 |
| 32 | MH 04 - MH 05 | 27 | 18.58 | 601.93 | 602.70 | 76.66 | 1.00 | 4.86 | 614.30 | 615.90 | 604.45 | 604.66 | 11.03 | 1.51 | 604.79 | 605.06 | 0.26 | 31.03 | 0.013 |
| 33 | MH 05 - OS 06 | 27 | 18.58 | 602.90 | 604.33 | 143.24 | 1.00 | 5.80 | 615.90 | 608.92 | 604.87 | 605.84 | 3.08 | 1.51 | 605.54 | 606.51 | 0.00 | 30.94 | 0.013 |
| 1 | FES 07 - CI 08 | 30 | 27.24 | 603.00 | 603.19 | 37.33 | 0.51 | 5.55 | 605.88 | 612.85 | 607.73 | 607.89 | 4.72 | 1.78 | 608.21 | 608.37 | 0.17 | 29.26 | 0.013 |
| 2 | CI 08 - CI 09 | 30 | 25.21 | 603.39 | 603.57 | 35.00 | 0.51 | 5.14 | 612.85 | 612.85 | 608.13 | 608.27 | 4.38 | 1.71 | 608.54 | 608.68 | 0.13 | 29.41 | 0.013 |
| 3 | CI 09 - AI 10 | 30 | 22.64 | 603.76 | 604.37 | 122.50 | 0.50 | 4.61 | 612.85 | 612.50 | 608.47 | 608.85 | 2.91 | 1.62 | 608.80 | 609.18 | 0.37 | 28.94 | 0.013 |
| 4 | AI 10 - AI 11 | 24 | 16.46 | 604.57 | 604.75 | 36.03 | 0.50 | 5.24 | 612.50 | 613.20 | 609.59 | 609.78 | 2.78 | 1.46 | 610.02 | 610.21 | 0.19 | 15.99 | 0.013 |
| 5 | AI 11 - AI 12 | 24 | 10.80 | 604.95 | 605.92 | 193.77 | 0.50 | 3.44 | 613.20 | 619.00 | 610.42 | 610.86 | 7.88 | 1.18 | 610.60 | 611.05 | 0.44 | 16.00 | 0.013 |
| 6 | AI 12 - MH 13 | 24 | 10.08 | 606.12 | 606.57 | 89.34 | 0.50 | 3.21 | 619.00 | 621.10 | 611.12 | 611.30 | 9.64 | 1.14 | 611.28 | 611.46 | 0.18 | 16.05 | 0.013 |
| 7 | MH 13 - CI 14 | 24 | 10.08 | 606.77 | 607.26 | 98.08 | 0.50 | 3.21 | 621.10 | 616.73 | 611.46 | 611.66 | 4.89 | 1.14 | 611.62 | 611.82 | 0.20 | 15.99 | 0.013 |
| 8 | CI 14 - CI 15 | 24 | 8.73 | 607.46 | 607.81 | 35.00 | 1.00 | 2.78 | 616.73 | 616.73 | 611.84 | 611.90 | 4.75 | 1.05 | 611.96 | 612.02 | 0.05 | 22.62 | 0.013 |
| 9 | CI 15 - AI 16 | 18 | 4.52 | 608.01 | 609.30 | 128.69 | 1.00 | 2.56 | 616.73 | 615.90 | 611.98 | 612.21 | 3.53 | 0.82 | 612.08 | 612.32 | 0.24 | 10.51 | 0.013 |
| 10 | AI 16 - AI 17 | 18 | 2.85 | 609.50 | 612.50 | 300.00 | 1.00 | 2.79 | 615.90 | 617. | | | | | | | | | |