

Description = STORM01-Dirt Cheap Storm Sewer (w/ Ground Saturation Factor 1.1)  
 Sewer Type = Storm  
 System Number = 1  
 Return Period (yr) = 15  
 Rainfall duration (min) = 20  
 Runoff Factor Multiplier = 1.10  
 Starting HGL Elev. (ft) = 560.70  
 Use St. Louis Co./MSD Losses? = Y

| STRUCTURES | FLOW LINES | SIZE    | LENGTH  | n       | AREA    | Qadd    | Qtotal  | ConS    | Yn      | PARTIAL | FULL    | LOSSES  | COND    | HGL     | UFR     | STR     |        |
|------------|------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--------|
| UFR/LWR    | UFR/LWR    | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR |        |
| CI 1-6     | 567.47     | 15"     | 62.40   | 0.013   | 0.21    | 0.79    | 0.79    | 2.66    | 0.23    | 0.65    | 0.65    | 0.01    | 0.01    | FP      | 596.76  | 571.14  |        |
| DGI 1-2    | 565.81     | 26"     | N       | N       | 3.77    | 10.56   | 10.56   | 0.01    | 0.35    | 30.93   | 0.01    | 0.00    | 0.00    | FP      | 596.74  | -25.62  |        |
| DGI 1-5    | 569.48     | 12"     | 71.42   | 0.013   | 0.79    | 2.83    | 2.83    | 1.44    | 0.59    | 3.80    | 3.80    | 0.45    | 0.27    | FP      | 598.13  | 573.15  |        |
| DGI 1-4    | 568.45     | 54"     | N       | N       | 3.58    | 4.29    | 4.29    | 0.63    | 0.72    | 28.97   | 0.20    | 0.00    | 0.00    | FP      | 597.42  | -24.98  |        |
| DGI 1-4    | 568.45     | 15"     | 49.45   | 0.013   | 0.13    | 0.46    | 0.46    | 3.29    | 2.85    | 4.77    | 2.68    | 0.13    | 0.00    | FP      | 597.42  | 573.95  |        |
| MH 1-3     | 567.04     | 36"     | N       | N       | 3.55    | 10.94   | 10.94   | 0.26    | 0.73    | 30.16   | 0.11    | 0.00    | 0.09    | FP      | 597.20  | -23.47  |        |
| MH 1-3     | 567.04     | 15"     | 100.00  | 0.013   | 0.14    | 0.54    | 0.54    | 3.83    | 1.23    | 0.65    | 3.12    | 0.35    | 0.07    | FP      | 597.20  | 573.37  |        |
| DGI 1-2    | 565.81     | 81"     | N       | N       | 3.85    | 7.18    | 7.18    | 0.35    | 0.79    | 30.93   | 0.15    | 0.00    | 0.04    | FP      | 596.74  | -23.83  |        |
| MH 1-1     | 565.81     | 51"     | N       | N       | 3.63    | 8.44    | 8.44    | 1.06    | 1.04    | 30.46   | 0.46    | 0.00    | 0.06    | FP      | 596.06  | -26.85  |        |
| CI 1-7     | 570.48     | 12"     | 18.00   | 0.022   | 0.46    | 1.71    | 1.71    | 1.70    | 1.00    | 6.68    | 2.17    | 0.12    | 0.10    | FP      | 599.97  | 581.98  |        |
| MH 1-EX6   | 570.30     | 21"     | N       | N       | 3.71    | 2.11    | 2.11    | 0.65    | 0.55    | 29.45   | 0.07    | 0.00    | 0.00    | FP      | 599.75  | -17.99  |        |
| CI 1-EX8   | 571.43     | 12"     | 6.89    | 0.013   | 0.84    | 3.16    | 3.16    | 1.02    | 0.73    | 4.02    | 4.02    | 0.05    | 0.33    | FP      | 601.06  | 581.93  |        |
| MH 1-EX7   | 571.38     | 75"     | N       | N       | 3.76    | 3.60    | 3.60    | 0.78    | 0.76    | 29.32   | 0.25    | 0.00    | 0.00    | FP      | 600.68  | -19.13  |        |
| MH 1-EX7   | 571.38     | 12"     | 98.13   | 0.013   | 0.00    | 0.00    | 0.00    | 3.16    | 1.08    | 0.71    | 4.02    | 0.77    | 0.00    | FP      | 600.68  | 575.81  |        |
| MH 1-EX6   | 570.30     | 85"     | N       | N       | 1.87    | 3.71    | 3.71    | 0.78    | 0.76    | 29.45   | 0.25    | 0.00    | 0.16    | FP      | 599.75  | -24.87  |        |
| MH 1-EX6   | 570.30     | 12"     | 163.81  | 0.013   | 0.00    | 0.00    | 0.00    | 4.86    | 2.87    | 0.68    | 6.19    | 6.19    | 3.03    | 0.54    | FP      | 599.75  | 575.11 |
| MH 1-1     | 565.81     | 29"     | N       | N       | 1.87    | 6.05    | 6.05    | 1.85    | 0.91    | 30.46   | 0.60    | 0.00    | 0.12    | FP      | 596.06  | -24.84  |        |
| MH 1-1     | 565.40     | 15"     | 20.88   | 0.013   | 0.00    | 0.00    | 0.00    | 11.52   | 4.45    | 0.88    | 9.38    | 9.38    | 0.66    | 1.14    | FP      | 596.06  | 570.43 |
| GI 1-EX2   | 564.47     | 41"     | N       | N       | 1.87    | 13.67   | 13.67   | 3.16    | 0.00    | 29.58   | 1.37    | 0.00    | 0.22    | FP      | 594.05  | -25.63  |        |
| GI 1-EX5   | 570.75     | 12"     | 217.20  | 0.022   | 0.89    | 3.01    | 3.01    | 1.93    | 1.00    | 3.84    | 3.84    | 4.43    | 0.30    | FP      | 602.87  | 572.06  |        |
| MH 1-EX4   | 566.56     | 9"      | N       | N       | 3.39    | 2.93    | 2.93    | 2.04    | 0.74    | 31.58   | 0.23    | 0.00    | 0.00    | FP      | 598.14  | -30.81  |        |
| GI 1-EX4   | 566.56     | 12"     | 88.94   | 0.022   | 0.31    | 1.08    | 1.08    | 4.09    | 1.73    | 1.00    | 5.21    | 5.21    | 3.34    | 0.34    | FP      | 598.14  | 569.56 |
| MH 1-EX3   | 565.02     | 1"      | N       | N       | 3.48    | 2.78    | 2.78    | 3.76    | 0.86    | 29.42   | 0.42    | 0.00    | 0.02    | FP      | 594.44  | -28.58  |        |
| MH 1-EX3   | 565.02     | 12"     | 10.38   | 0.022   | 0.00    | 0.00    | 0.00    | 4.09    | 5.30    | 0.70    | 5.21    | 5.21    | 0.39    | 0.00    | FP      | 594.44  | 567.66 |
| GI 1-EX2   | 564.47     | 90"     | N       | N       | 1.87    | 4.86    | 4.86    | 3.76    | 0.86    | 29.58   | 0.42    | 0.00    | 0.01    | FP      | 594.05  | -26.78  |        |
| GI 1-EX2   | 564.47     | 15"     | 158.43  | 0.022   | 0.33    | 1.16    | 1.16    | 16.76   | 3.17    | 1.25    | 13.66   | 13.66   | 30.39   | 2.47    | FP      | 594.05  | 567.17 |
| MH 1-EX1   | 559.45     | 0"      | N       | N       | 3.50    | 6.81    | 6.81    | 19.18   | 0.00    | 1.25    | 2.90    | 0.00    | 0.48    | FP      | 560.70  | -26.88  |        |

Description = STORM 02-Connect to MODOOT Sewer(w/ Ground Saturation Factor 1.1)  
 Sewer Type = Storm  
 System Number = 2  
 Return Period (yr) = 15  
 Rainfall duration (min) = 20  
 Runoff Factor Multiplier = 1.10  
 Starting HGL Elev. (ft) = 569.52  
 Use St. Louis Co./MSD Losses? = Y

| STRUCTURES | FLOW LINES | SIZE    | LENGTH  | n       | AREA    | Qadd    | Qtotal  | ConS    | Yn      | PARTIAL | FULL    | LOSSES  | COND    | HGL     | UFR     | STR     |
|------------|------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| UFR/LWR    | UFR/LWR    | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR | UFR/LWR |
| AI 2-2     | 568.92     | 12"     | 24.30   | 0.013   | 0.07    | 0.19    | 0.19    | 1.65    | 0.14    | 0.24    | 0.24    | 0.00    | 0.00    | OC      | 569.52  | 572.92  |
| MH 2-1     | 568.52     | 12"     | N       | N       | 2.72    | 4.58    | 4.58    | 0.00    | 0.18    | 1.00    | 0.00    | 0.00    | 0.00    | OC      | 569.52  | 572.92  |

**LEGEND**

UFR - At upper end of pipe  
 LWR - At lower end of pipe  
 SIZE - Sewer size (diam or WxH)  
 ANGLE - Downstream deflection (deg)  
 LENGTH - Pipe length (ft)  
 CURVED - Pipe is curved?  
 n - Manning's roughness factor  
 AREA - Upper drainage area (ac)  
 PI - Runoff factor (cfs/ac)  
 Qadd - Added flowrate (cfs)  
 Qtotal - Total flowrate (cfs)  
 Qfull - Pipe full capacity (cfs)  
 ConS - Construction slope of pipe (%)  
 Reqds - Minimum required slope (%)

Yn - Normal depth (ft)  
 Yc - Critical depth (ft)  
 PARTIAL - Conditions at lower end of pipe  
 FULL - Conditions assuming full pipe flow  
 V - Velocity (fps)  
 Whead - Velocity head (ft)

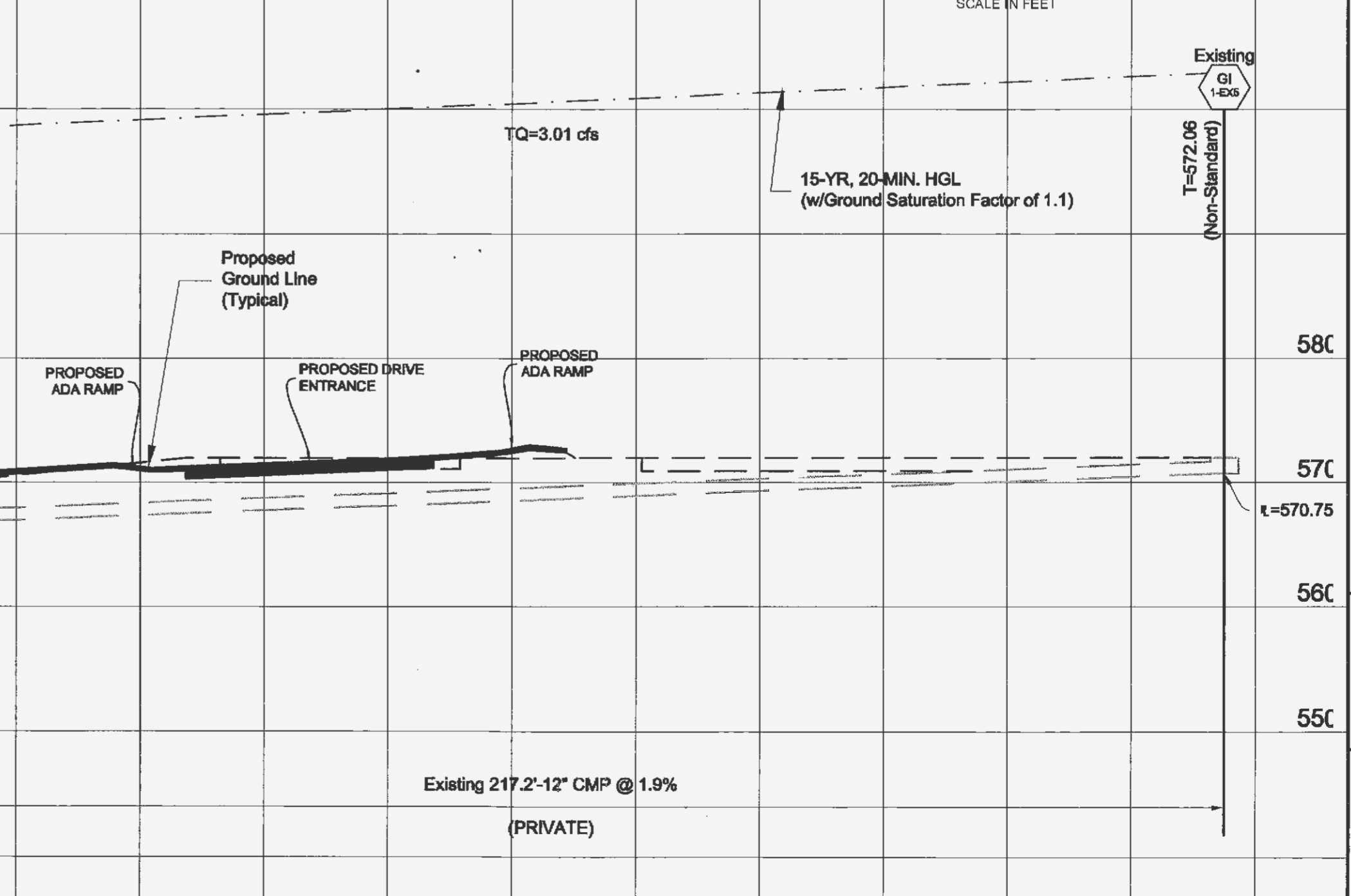
COND - Flow condition code at each pipe end:  
 FP - full pipe flow  
 OC - open channel flow  
 ND - set to normal depth  
 CD - set to critical depth  
 OF - initially set to open channel depth then set to full pipe flow  
 OJ - open channel flow but hydraulic jump may occur downstream

HGL - Hydraulic grade line elevation (ft)  
 TOP - Elev. of top of upper struct (ft msl)  
 FRBD - Difference btwn upper HGL and TOP (ft)

Notes:  
 1. Friction losses computed w/ Manning's formula if full pipe flow or back-calculated if open channel flow (simulating flow profile)  
 2. HGL at upper structure includes structure losses calculated with actual inflowing velocities using iterative procedure  
 3. Velocity and turn structure loss components only computed for incoming pipes with invert elevations below outlet crown elevation

**CONCRETE ENCASUREMENT NOTE:**  
 Encase with concrete both sanitary and storm sewer at crossing when storm sewer is within 18 inches above sanitary sewer.  
 Add concrete cradle to only RCP storm sewer and encase HDPE storm sewer when it is more than 18 inches above sanitary line.

**STORMWATER RUNOFF FLOW NOTE:**  
 Total Flow, "TQ", shown on these profiles is based on the 15-yr, 20-min Design Storm with a Ground Saturation Factor of 1.1 applied.



The signed and sealed original of this drawing is on file at the offices of The Clayton Engineering Company, Inc. The signed and sealed original is the official document and shall take precedence over any digital version.

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The Contractor shall be responsible for verifying the actual location of all underground facilities, structures, & utilities, either shown or not shown on these plans. The underground facilities, structures, & 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.

**PROJECT TITLE:**  
 SITE CONSTRUCTION PLANS  
 DIRT CHEAP OF FALLOON  
 #708 MO. STATE HIGHWAY K  
 OF FALLOON, MISSOURI 63366

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Plan Date: November 8, 2013  
 Revision Date: April 28, 2014  
 Revision Date: May 22, 2014  
 Revision Date: August 1, 2014  
 Revision Date: Sept. 4, 2014

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**SEWER PROFILES**

P+Z No: (23-13.02)  
 Approval Date: 10/03/13  
 City No.

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CONSTRUCTION SET - SEPTEMBER 4, 2014