

Parker Adventist Hospital MOB III



November 15, 2018

Town of Parker
Engineering Development Review
20120 East Main Street
Parker, CO 80138

Denver

Abu Dhabi

RE: Parker Adventist Hospital – MOB III

Civil
Structural
Integrated Services

To whom it may concern,

This letter serves as a Drainage Conformance Letter for the MOB III addition at the Parker Adventist Hospital. This letter references the Final Drainage and Erosion Control Report for the Parker Adventist Hospital, prepared by S. A. Miro, Inc., dated May 1, 2002. The latest update to the report was for the Parking Lot a, prepared by S. A. Miro, Inc., dated March, 2018.

The purpose of this letter is to demonstrate the existing and proposed storm sewer facilities serving the improvements for the Parker Adventist Hospital can convey the runoff generated by the proposed MOB III. All tributary drainage from the MOB is routed through existing and proposed storm sewer facilities to the south detention/water quality pond.

I. PROJECT DESCRIPTION

Improvements that impact the storm sewer facilities are as follows:

- The construction of Medical Office Building III, located northeast of the Sierra MOB, with a footprint of 23,288 sq. ft.
- Proposed parking lot, with an added impervious area of 151,740 sq. ft. (188,840 sq. ft. total parking lot area)
- The addition of approximately 1,185 LF of proposed storm sewer pipe and 12 proposed inlets.

The sub-basins that have been modified for these additions are the following, DA5, DA6, DA13, and F1, with the addition of sub-basins E1-E15.

The Parker Adventist Hospital campus was master planned with the anticipation of the entire campus to be fully developed. While the proposed development is increasing imperviousness, it is still within the planned overall imperviousness. The existing storm infrastructure was sized with future development in mind and can convey increased flows to the South pond. The proposed design is accounting for future development to be conveyed through the system as well. See the appendix for further information regarding storm sewer conveyance.

II. DRAINAGE FACILITY DESIGN

Detention/Water Quality

All proposed storm runoff will be conveyed via storm pipe and discharged to the South pond. The South pond has been master planned to detain and treat the eastern half of the Parker Adventist Hospital site in a future, fully-developed condition.

Parker Adventist Hospital MOB III

Storm Sewer Layout

The proposed storm sewer system will tie into the existing infrastructure at three different locations. The roof drain will connect into an existing storm line which previously led to an inlet but is being removed. Storm line B will tie into an existing area inlet located at the north end of existing parking lot C. Storm line A will tie into the 24" PVC line that currently takes on flows from basin F1, but as designed with the intention of taking on future development flows. The proposed storm sewer was analyzed using the StormCAD V8i program to ensure that the added storm infrastructure does not overwhelm the existing system. The hydraulic grade lines are under the required 1-foot below finish grade at the manholes. The system was checked against flows in the 100-yr condition, but Parker minimum pipe size standards (18" RCP) drove a majority of the pipe sizes. Therefore, the existing and proposed storm sewer is expected to function adequately to convey the anticipated runoff flows.

III. CONCLUSIONS

Compliance with Standards

This Drainage Conformance Letter complies with the Town of Parker Storm Drainage and Environmental Criteria Manual, and the Urban Storm Drainage Criteria Manual. The drainage system is designed to efficiently intercept runoff in curb and gutter and storm sewer and convey the flows to the South detention/water quality pond. The site provides a drainage system which does not exceed the allowable capacities of the existing storm sewer/drainage facilities.

Please call us if you have any questions.

Sincerely,

Jason D. Carr, P.E.
Associate Principle

IV. APPENDICIES

- a. HYDROLOGIC CALCULATIONS**
- b. HYDRAULIC CALCULATIONS**
- c. MAPS**

APPENDIX

**Appendix A
Hydrologic Calculations**



Historic Composite C Calculations

Project Information
 Project Name: MOB III
 Miro Project No: 18057
 Revised Date: 8/7/2018
 Calculated By: MHV

Jurisdiction Impervious Value
 Pond Area 100% Impervious
 Landscape Area 0% Impervious
 Paved Area 100% Impervious
 Roof Area 90% Impervious

Coefficient Equations
 $K_{CD(2)} = 0$ $K_{CD(10)} = -0.18i + 0.21$
 $K_{CD(5)} = -0.10i + 0.11$ $K_{CD(100)} = -0.39i + 0.46$
 $C_{CD} = K_{CD} + (0.858i^3 - 0.786i^2 + 0.774i + 0.04)$

*NOTE: K_{CD} & C_{CD} Equations from UDFCD Criteria Manual

| Basin Designation | A _{pond} (ft ²) | A _{landscape} (ft ²) | A _{paved} (ft ²) | A _{roof} (ft ²) | A _{total} (acres) | Impervious-ness | K _{CD} 02-yr | K _{CD} 05-yr | K _{CD} 10-yr | K _{CD} 100-yr | C _{CD} 02 yr | C _{CD} 05 yr | C _{CD} 10 yr | C _{CD} 100 yr |
|---------------------|--------------------------------------|---|---------------------------------------|--------------------------------------|----------------------------|-----------------|-----------------------|-----------------------|-----------------------|------------------------|-----------------------|-----------------------|-----------------------|------------------------|
| *A1 | | | | | 4.61 | 67% | 0 | 0.04 | 0.09 | 0.20 | 0.46 | 0.51 | 0.55 | 0.66 |
| *A2 | | | | | 0.71 | 52% | 0 | 0.06 | 0.12 | 0.26 | 0.35 | 0.41 | 0.47 | 0.61 |
| *A3 | | | | | 0.32 | 2% | 0 | 0.11 | 0.21 | 0.45 | 0.06 | 0.16 | 0.26 | 0.51 |
| A4 | | 7131 | 515 | | 0.18 | 7% | 0 | 0.10 | 0.20 | 0.43 | 0.09 | 0.19 | 0.29 | 0.52 |
| A5 | | 5045 | 15105 | | 0.46 | 75% | 0 | 0.04 | 0.08 | 0.17 | 0.54 | 0.57 | 0.62 | 0.71 |
| B1# | | | | | 1.20 | 80% | 0 | 0.03 | 0.07 | 0.15 | 0.60 | 0.63 | 0.66 | 0.74 |
| B1A# | | | | | 0.14 | 80% | 0 | 0.03 | 0.07 | 0.15 | 0.60 | 0.63 | 0.66 | 0.74 |
| B2# | | | | | 0.82 | 85% | 0 | 0.03 | 0.06 | 0.13 | 0.66 | 0.68 | 0.71 | 0.79 |
| B2A# | | | | | 0.73 | 79% | 0 | 0.03 | 0.07 | 0.15 | 0.58 | 0.61 | 0.65 | 0.74 |
| B2B# | | | | | 1.15 | 85% | 0 | 0.03 | 0.06 | 0.13 | 0.66 | 0.68 | 0.71 | 0.79 |
| B3*** | | | | | 0.73 | 67% | 0 | 0.04 | 0.09 | 0.20 | 0.46 | 0.51 | 0.55 | 0.66 |
| B3-1*** | | | | | 0.03 | 0% | 0 | 0.11 | 0.21 | 0.46 | 0.04 | 0.15 | 0.25 | 0.50 |
| B3-2*** | | | | | 0.14 | 60% | 0 | 0.05 | 0.10 | 0.23 | 0.41 | 0.46 | 0.51 | 0.63 |
| B4*** | | | | | 1.24 | 100% | 0 | 0.01 | 0.03 | 0.07 | 0.89 | 0.90 | 0.92 | 0.96 |
| B5*** | | | | | 0.55 | 72% | 0 | 0.04 | 0.08 | 0.18 | 0.51 | 0.55 | 0.59 | 0.69 |
| B5A*** | | | | | 0.10 | 89% | 0 | 0.02 | 0.05 | 0.11 | 0.71 | 0.73 | 0.76 | 0.82 |
| B5B*** | | | | | 0.20 | 80% | 0 | 0.03 | 0.07 | 0.15 | 0.60 | 0.63 | 0.66 | 0.74 |
| B5C*** | | | | | 0.08 | 88% | 0 | 0.02 | 0.05 | 0.12 | 0.70 | 0.72 | 0.75 | 0.81 |
| B6A(EX)** | | | | | 0.67 | 78% | 0 | 0.03 | 0.07 | 0.16 | 0.57 | 0.60 | 0.64 | 0.73 |
| B6B(EX) | | | | | 0.53 | 87% | 0 | 0.02 | 0.05 | 0.12 | 0.68 | 0.71 | 0.74 | 0.80 |
| B6C** | | | | | 0.03 | 82% | 0 | 0.03 | 0.06 | 0.14 | 0.62 | 0.65 | 0.68 | 0.76 |
| B6D** | | | | | 0.02 | 28% | 0 | 0.08 | 0.16 | 0.35 | 0.21 | 0.30 | 0.37 | 0.56 |
| B7 (EX)* | | | | | 2.20 | 37% | 0 | 0.07 | 0.14 | 0.32 | 0.26 | 0.34 | 0.41 | 0.58 |
| B7A | | 21,047 | 69,660 | | 2.08 | 77% | 0 | 0.03 | 0.07 | 0.16 | 0.56 | 0.59 | 0.63 | 0.72 |
| B7B | 26319 | 12,883 | | | 0.90 | 67% | 0 | 0.04 | 0.09 | 0.20 | 0.47 | 0.51 | 0.55 | 0.66 |
| B8*** | | | | | 0.18 | 11% | 0 | 0.10 | 0.19 | 0.42 | 0.12 | 0.22 | 0.31 | 0.53 |
| C1A# | | | | | 0.05 | 41% | 0 | 0.07 | 0.14 | 0.30 | 0.28 | 0.35 | 0.42 | 0.58 |
| C1B# | | | | | 0.18 | 47% | 0 | 0.06 | 0.13 | 0.28 | 0.32 | 0.38 | 0.44 | 0.60 |
| C1C# | | | | | 0.31 | 86% | 0 | 0.02 | 0.06 | 0.12 | 0.67 | 0.69 | 0.73 | 0.79 |
| C1D# | | | | | 0.93 | 89% | 0 | 0.02 | 0.05 | 0.11 | 0.71 | 0.73 | 0.76 | 0.82 |
| C2# | | | | | 0.36 | 92% | 0 | 0.02 | 0.04 | 0.10 | 0.75 | 0.77 | 0.80 | 0.86 |
| C3*** | | | | | 0.41 | 88% | 0 | 0.02 | 0.05 | 0.12 | 0.70 | 0.72 | 0.75 | 0.81 |
| C5# | | | | | 0.22 | 50% | 0 | 0.06 | 0.12 | 0.27 | 0.34 | 0.40 | 0.46 | 0.60 |
| C7 (EX)** | | | | | 1.75 | 45% | 0 | 0.07 | 0.13 | 0.28 | 0.31 | 0.37 | 0.44 | 0.59 |
| C7 | | 26,034 | 50,346 | | 1.75 | 66% | 0 | 0.04 | 0.09 | 0.20 | 0.45 | 0.50 | 0.55 | 0.66 |
| C8** | | | | | 0.48 | 80% | 0 | 0.03 | 0.07 | 0.15 | 0.60 | 0.63 | 0.66 | 0.74 |
| C9 | | 4,162 | 6,898 | | 0.25 | 62% | 0 | 0.05 | 0.10 | 0.22 | 0.43 | 0.47 | 0.52 | 0.64 |
| D1# | | | | | 0.26 | 90% | 0 | 0.02 | 0.05 | 0.11 | 0.73 | 0.75 | 0.77 | 0.83 |
| D2# | | | | | 0.49 | 90% | 0 | 0.02 | 0.05 | 0.11 | 0.73 | 0.75 | 0.77 | 0.83 |
| D3# | | | | | 0.53 | 90% | 0 | 0.02 | 0.05 | 0.11 | 0.73 | 0.75 | 0.77 | 0.83 |
| D4** | | | | | 0.67 | 90% | 0 | 0.02 | 0.05 | 0.11 | 0.73 | 0.75 | 0.77 | 0.83 |
| D5*** | | | | | 0.40 | 90% | 0 | 0.02 | 0.05 | 0.11 | 0.73 | 0.75 | 0.77 | 0.83 |
| D6# | | | | | 0.25 | 90% | 0 | 0.02 | 0.05 | 0.11 | 0.73 | 0.75 | 0.77 | 0.83 |
| D7** | | | | | 0.67 | 90% | 0 | 0.02 | 0.05 | 0.11 | 0.73 | 0.75 | 0.77 | 0.83 |
| DA1# | | | | | 0.66 | 71% | 0 | 0.04 | 0.08 | 0.18 | 0.50 | 0.54 | 0.58 | 0.68 |
| DA2# | | | | | 0.47 | 95% | 0 | 0.02 | 0.04 | 0.09 | 0.80 | 0.82 | 0.84 | 0.89 |
| DA5# | | | | | 0.97 | 93% | 0 | 0.02 | 0.04 | 0.10 | 0.77 | 0.79 | 0.81 | 0.87 |
| DA6# | | | | | 0.61 | 50% | 0 | 0.06 | 0.12 | 0.27 | 0.34 | 0.40 | 0.46 | 0.60 |
| DA7# | | | | | 0.19 | 96% | 0 | 0.01 | 0.04 | 0.09 | 0.82 | 0.83 | 0.85 | 0.90 |
| DA8# | | | | | 0.48 | 88% | 0 | 0.02 | 0.05 | 0.12 | 0.70 | 0.72 | 0.75 | 0.81 |
| DA9# | | | | | 0.08 | 74% | 0 | 0.04 | 0.08 | 0.17 | 0.53 | 0.57 | 0.61 | 0.70 |
| DA10# | | | | | 1.17 | 99% | 0 | 0.01 | 0.03 | 0.07 | 0.87 | 0.88 | 0.90 | 0.94 |
| DA11# | | | | | 0.03 | 4% | 0 | 0.11 | 0.20 | 0.44 | 0.07 | 0.18 | 0.27 | 0.51 |
| DA12# | | | | | 0.43 | 76% | 0 | 0.03 | 0.07 | 0.16 | 0.55 | 0.58 | 0.62 | 0.71 |
| DA13* | | | | | 1.50 | 69% | 0 | 0.04 | 0.09 | 0.19 | 0.48 | 0.52 | 0.57 | 0.67 |
| DA15# | | | | | 0.05 | 20% | 0 | 0.09 | 0.17 | 0.38 | 0.17 | 0.26 | 0.34 | 0.55 |
| DA16# | | | | | 0.08 | 57% | 0 | 0.05 | 0.11 | 0.24 | 0.38 | 0.44 | 0.49 | 0.62 |
| OS-1* | | | | | 6.40 | 2% | 0 | 0.11 | 0.21 | 0.45 | 0.06 | 0.16 | 0.26 | 0.51 |
| OS-2* | | | | | 12.80 | 2% | 0 | 0.11 | 0.21 | 0.45 | 0.06 | 0.16 | 0.26 | 0.51 |
| OS-3* | | | | | 164.50 | 2% | 0 | 0.11 | 0.21 | 0.45 | 0.06 | 0.16 | 0.26 | 0.51 |
| OS-4* | | | | | 3.11 | 2% | 0 | 0.11 | 0.21 | 0.45 | 0.06 | 0.16 | 0.26 | 0.51 |
| OS-5* | | | | | 0.54 | 100% | 0 | 0.01 | 0.03 | 0.07 | 0.89 | 0.90 | 0.92 | 0.96 |
| F1* | | | | | 5.37 | 63% | 0 | 0.05 | 0.10 | 0.21 | 0.43 | 0.48 | 0.53 | 0.64 |
| R1# | | | | | 0.48 | 90% | 0 | 0.02 | 0.05 | 0.11 | 0.73 | 0.75 | 0.77 | 0.83 |
| F3* | | | | | 0.36 | 69% | 0 | 0.04 | 0.09 | 0.19 | 0.48 | 0.52 | 0.57 | 0.67 |
| F4* | | | | | 0.69 | 73% | 0 | 0.04 | 0.08 | 0.18 | 0.52 | 0.56 | 0.60 | 0.70 |
| F5# | | | | | 2.24 | 100% | 0 | 0.01 | 0.03 | 0.07 | 0.89 | 0.90 | 0.92 | 0.96 |
| F6* | | | | | 0.23 | 71% | 0 | 0.04 | 0.08 | 0.18 | 0.50 | 0.54 | 0.58 | 0.68 |
| | | | | | 0.00 | | | | | | | | | |
| South Pond Trib | | | | | 28.89 | 44% | 0 | 0.07 | 0.13 | 0.29 | 0.30 | 0.37 | 0.43 | 0.59 |
| SW Pond Trib | | | | | 25.40 | 61% | 0 | 0.05 | 0.10 | 0.22 | 0.41 | 0.46 | 0.51 | 0.64 |
| Total Onsite | | | | | 54.29 | 52% | 0 | 0.06 | 0.12 | 0.26 | 0.35 | 0.41 | 0.46 | 0.61 |

From Addendum to Final Drainage Plan dated 7/22/2008

* Approved Master Planned Impervious Values used

** From Update dated 1/6/2010

*** From Update dated 6/13/2014

| | | |
|----------------|-------|-----|
| Master Basin B | 6.72 | 80% |
| | 9.37 | 74% |
| | 12.80 | 2% |
| Master Basin A | 8.36 | 82% |
| | 5.62 | 75% |
| | 5.76 | 81% |
| | 6.40 | 2% |



Composite C Calculations

Project Information

Project Name: Parker MOB III
Miro Project No: 18057
Revised Date: 10/15/2018
Calculated By: DAT

Jurisdiction Impervious Value

Pond Area 100%
Landscape Area 2%
Paved Area 100%
Roof Area 90%

Coefficient Equations

$C_{CD(2)} = 0.83I^{1.122}$ $C_{CD(10)} = 0.74i + 0.132$
 $C_{CD(5)} = 0.82i + 0.035$ $C_{CD(100)} = 0.4i + 0.484$

*NOTE: C_{CD} Equations from UDFCD Criteria Manual updated March 2017

| Basin Designation | A _{pond} (ft ²) | A _{landscape} (ft ²) | A _{paved} (ft ²) | A _{roof} (ft ²) | A _{total} (acres) | Impervious-ness | C _{CD} 02 yr | C _{CD} 05 yr | C _{CD} 10 yr | C _{CD} 100 yr |
|-------------------|--------------------------------------|---|---------------------------------------|--------------------------------------|----------------------------|-----------------|-----------------------|-----------------------|-----------------------|------------------------|
| E1 | | | | 23,473 | 0.54 | 90% | 0.72 | 0.77 | 0.80 | 0.84 |
| E2 | | 23,244 | | | 0.53 | 2% | 0.01 | 0.05 | 0.15 | 0.49 |
| E3 | | 2,562 | 6,608 | | 0.21 | 73% | 0.57 | 0.63 | 0.67 | 0.77 |
| E4 | | 4,010 | 10,513 | | 0.33 | 73% | 0.57 | 0.63 | 0.67 | 0.78 |
| E5 | | 4,799 | 11,708 | | 0.38 | 72% | 0.56 | 0.62 | 0.66 | 0.77 |
| E6 | | 11,551 | | | 0.27 | 2% | 0.01 | 0.05 | 0.15 | 0.49 |
| E7 | | 12,542 | 18,703 | | 0.72 | 61% | 0.46 | 0.53 | 0.58 | 0.73 |
| E8 | | 1,360 | 3,183 | | 0.10 | 71% | 0.55 | 0.61 | 0.65 | 0.77 |
| E9 | | 1,971 | 25,406 | | 0.63 | 93% | 0.75 | 0.80 | 0.82 | 0.86 |
| E10 | | 2,585 | 19,070 | | 0.50 | 88% | 0.71 | 0.76 | 0.79 | 0.84 |
| E11 | | 917 | 26,635 | | 0.63 | 97% | 0.78 | 0.83 | 0.85 | 0.87 |
| E12 | | | 16,075 | | 0.37 | 100% | 0.81 | 0.86 | 0.87 | 0.88 |
| E13 | | 1,748 | 10,475 | | 0.28 | 86% | 0.68 | 0.74 | 0.77 | 0.83 |
| E14 | | 735 | 20,646 | | 0.49 | 97% | 0.78 | 0.83 | 0.85 | 0.87 |
| E15 | | 9,837 | 5,494 | | 0.35 | 37% | 0.27 | 0.34 | 0.41 | 0.63 |
| | | | | | 0.00 | | | | | |
| F1 | | 82,679 | | | 1.90 | 2% | 0.01 | 0.05 | 0.15 | 0.49 |
| TOTAL | | 160,540 | 174,516 | 23,473 | 8.23 | 55% | 0.42 | 0.49 | 0.54 | 0.71 |
| | | | | | 0.00 | | | | | |
| DA1 | | 8,337 | 20,412 | | 0.66 | 72% | 0.56 | 0.62 | 0.66 | 0.77 |
| DA2 | | 1,024 | 19,450 | | 0.47 | 95% | 0.77 | 0.81 | 0.84 | 0.86 |
| DA7 | | 331 | 7,945 | | 0.19 | 96% | 0.78 | 0.82 | 0.84 | 0.87 |
| DA8 | | 2,509 | 18,400 | | 0.48 | 88% | 0.71 | 0.76 | 0.78 | 0.84 |
| DA9 | | 906 | 2,579 | | 0.08 | 75% | 0.58 | 0.65 | 0.68 | 0.78 |
| DA10 | | 509 | 50,456 | | 1.17 | 99% | 0.80 | 0.85 | 0.86 | 0.88 |
| DA11 | | 1,254 | 52 | | 0.03 | 6% | 0.03 | 0.08 | 0.18 | 0.51 |
| DA15 | | 1,742 | 436 | | 0.05 | 22% | 0.15 | 0.21 | 0.29 | 0.57 |
| DA16 | | 1,498 | 1,986 | | 0.08 | 58% | 0.44 | 0.51 | 0.56 | 0.72 |
| F3 | | 4,861 | 10,820 | | 0.36 | 70% | 0.54 | 0.61 | 0.65 | 0.76 |
| F4 | | 8,115 | 21,941 | | 0.69 | 74% | 0.57 | 0.64 | 0.68 | 0.78 |



TIME OF CONCENTRATION

Project Information
 Project Name: Parker MOB III
 S.A. Project No: 18057
 Revised Date: 10/15/2018
 Calculated By: DAT

Conveyance Coefficient Value
 Grassed Waterway 15
 Heavy Meadow 2.5
 Nearly Bare Ground 10
 Paved Areas and Shallow Paved Swales 20
 Short Pasture and Lawns 7
 Tillage / Field 5

Time of Concentration Equations
 $t_t = 0.395(1.1 - C_5)L^{1/2} / S^{1/3}$ $t_t = (L/v)/60$
 $t_c \text{ check: } t_c = (26-17i) + (L/(60(14i+19)S^{1/2}))$

*NOTE: Cv Values, T_i, T_t, & T_c Equations from UDFCD Criteria Manual updated March 2017

| SUB-BASIN DATA | | | INITIAL/OVERLAND TIME (t _i) | | | TRAVEL TIME (t _t) | | | | | | t _i + t _t | | t _c CHECK (urbanized basins) | | FINAL t _c USED |
|-------------------|--------------|-----------------------|---|---------|----------------------|-------------------------------|---------|--------------------------------------|---------------------------|-------------------|----------------------|---------------------------------|-------------------|---|----------------------|---------------------------|
| Basin Designation | Area (acres) | C _{CD} 05 yr | length (ft) | slope % | t _i (min) | length (ft) | slope % | Type of Land Surface | Conveyance Coefficient Cv | velocity (ft/sec) | t _t (min) | t _c (min) | Total Length (ft) | t _c (min) | t _c (min) | |
| E1 | 0.54 | 0.77 | 225 | 1.00% | 8.99 | 0 | 1.00% | Paved areas and shallow paved swales | 20 | 2.00 | 0 | 8.99 | 225 | 12.44 | 8.99 | |
| E2 | 0.53 | 0.05 | 86 | 15.00% | 7.23 | 275 | 2.50% | Paved areas and shallow paved swales | 20 | 3.16 | 1.45 | 8.68 | 361 | 29.76 | 8.68 | |
| E3 | 0.21 | 0.63 | 55 | 4.00% | 4.02 | 91 | 4.30% | Paved areas and shallow paved swales | 20 | 4.15 | 0.37 | 4.39 | 146 | 14.27 | 5.00 | |
| E4 | 0.33 | 0.63 | 84 | 1.20% | 7.38 | 148 | 2.60% | Paved areas and shallow paved swales | 20 | 3.22 | 0.76 | 8.15 | 232 | 14.85 | 8.15 | |
| E5 | 0.38 | 0.62 | 110 | 2.00% | 7.30 | 120 | 2.90% | Paved areas and shallow paved swales | 20 | 3.41 | 0.59 | 7.89 | 230 | 15.03 | 7.89 | |
| E6 | 0.27 | 0.05 | 66 | 18.00% | 5.96 | 0 | 1.00% | Paved areas and shallow paved swales | 20 | 2.00 | 0 | 5.96 | 66 | 26.85 | 5.96 | |
| E7 | 0.72 | 0.53 | 271 | 4.00% | 10.79 | 0 | 1.00% | Paved areas and shallow paved swales | 20 | 2.00 | 0 | 10.79 | 271 | 18.27 | 10.79 | |
| E8 | 0.10 | 0.61 | 110 | 2.00% | 7.41 | 0 | 10.0% | Paved areas and shallow paved swales | 20 | 6.32 | 0 | 7.41 | 110 | 14.29 | 7.41 | |
| E9 | 0.63 | 0.80 | 200 | 2.90% | 5.51 | 63 | 1.0% | Paved areas and shallow paved swales | 20 | 2.00 | 0.53 | 6.03 | 263 | 12.19 | 6.03 | |
| E10 | 0.50 | 0.76 | 236 | 3.6% | 6.27 | 0 | 1.0% | Paved areas and shallow paved swales | 20 | 2.00 | 0 | 6.27 | 236 | 12.83 | 6.27 | |
| E11 | 0.63 | 0.83 | 206 | 3.80% | 4.58 | 83 | 1.8% | Paved areas and shallow paved swales | 20 | 2.68 | 0.52 | 5.10 | 289 | 11.15 | 5.10 | |
| E12 | 0.37 | 0.86 | 138 | 4.00% | 3.32 | 85 | 1.6% | Paved areas and shallow paved swales | 20 | 2.53 | 0.56 | 3.88 | 223 | 10.28 | 5.00 | |
| E13 | 0.28 | 0.74 | 85 | 3.50% | 4.01 | 45 | 3.0% | Paved areas and shallow paved swales | 20 | 3.46 | 0.22 | 4.22 | 130 | 11.98 | 5.00 | |
| E14 | 0.49 | 0.83 | 150 | 2.80% | 4.34 | 115 | 1.5% | Paved areas and shallow paved swales | 20 | 2.45 | 0.78 | 5.13 | 265 | 11.17 | 5.13 | |
| E15 | 0.35 | 0.34 | 0 | 1.00% | 0.00 | 300 | 2.40% | Paved areas and shallow paved swales | 20 | 3.10 | 1.61 | 1.61 | 300 | 21.96 | 5.00 | |
| F1 | 1.90 | 0.05 | 192 | 4.60% | 16.02 | 0 | 1.0% | Paved areas and shallow paved swales | 20 | 2.00 | 0 | 16.02 | 192 | 29.11 | 16.02 | |
| TOTAL | 8.23 | 0.49 | | | 0 | | | Paved areas and shallow paved swales | 20 | | 0 | 0.00 | 0 | #DIV/0! | #DIV/0! | |
| | | | | | | | | Paved areas and shallow paved swales | | | | | | | | |



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 $t_t = 0.395(1.1 - C_5)L^{1/2} / S^{1/3}$ $t_t = (L/v)/60$
 $t_c \text{ check: } t_c = (26-17i) + (L/(60(14i+19)S^{1/2}))$

*NOTE: Cv Values, T_i, T_c, & T_c Equations from UDFCD Criteria Manual updated March 2017

| SUB-BASIN DATA | | | INITIAL/OVERLAND TIME (t _i) | | | TRAVEL TIME (t _t) | | | | | | t _i + t _t | | t _c CHECK (urbanized basins) | | FINAL t _c USED |
|-------------------|--------------|-----------------------|---|---------|----------------------|-------------------------------|---------|--------------------------------------|---------------------------|-------------------|----------------------|---------------------------------|-------------------|---|----------------------|---------------------------|
| Basin Designation | Area (acres) | C _{CD} 05 yr | length (ft) | slope % | t _i (min) | length (ft) | slope % | Type of Land Surface | Conveyance Coefficient Cv | velocity (ft/sec) | t _t (min) | t _c (min) | Total Length (ft) | t _c (min) | t _c (min) | |
| DA1 | 0.66 | 0.62 | 202 | 4.00% | 7.85 | 0 | 1.0% | Paved areas and shallow paved swales | 20 | 2.00 | 0 | 7.85 | 202 | 15.60 | 7.85 | |
| DA2 | 0.47 | 0.81 | 200 | 3.70% | 4.78 | 18 | 2.0% | Paved areas and shallow paved swales | 20 | 2.83 | 0.11 | 4.89 | 218 | 10.98 | 5.00 | |
| DA7 | 0.19 | 0.82 | 12 | 2.00% | 1.40 | 250 | 2.00% | Paved areas and shallow paved swales | 20 | 2.83 | 1.47 | 2.87 | 262 | 11.04 | 5.00 | |
| DA8 | 0.48 | 0.76 | 12 | 3.10% | 1.49 | 225 | 3.10% | Paved areas and shallow paved swales | 20 | 3.52 | 1.06 | 2.55 | 237 | 12.05 | 5.00 | |
| DA9 | 0.08 | 0.65 | 12 | 2.90% | 2.02 | 240 | 2.90% | Paved areas and shallow paved swales | 20 | 3.41 | 1.17 | 3.20 | 252 | 14.60 | 5.00 | |
| DA10 | 1.17 | 0.85 | 20 | 3.80% | 1.33 | 130 | 3.80% | Paved areas and shallow paved swales | 20 | 3.90 | 0.56 | 1.89 | 150 | 9.73 | 5.00 | |
| DA11 | 0.03 | 0.08 | 52 | 2.00% | 10.67 | 0 | 2.60% | Paved areas and shallow paved swales | 20 | 3.22 | 0 | 10.67 | 52 | 25.54 | 10.67 | |
| DA15 | 0.05 | 0.21 | 93 | 2.00% | 12.46 | 0 | 1.00% | Paved areas and shallow paved swales | 20 | 2.00 | 0 | 12.46 | 93 | 23.61 | 12.46 | |
| DA16 | 0.08 | 0.51 | 63 | 2.00% | 6.82 | 0 | 1.00% | Paved areas and shallow paved swales | 20 | 2.00 | 0 | 6.82 | 63 | 16.78 | 6.82 | |
| F3 | 0.36 | 0.61 | 10 | 2.00% | 2.27 | 300 | 3.7% | Paved areas and shallow paved swales | 20 | 3.85 | 1.30 | 3.57 | 310 | 15.60 | 5.00 | |
| F4 | 0.03 | 0.64 | 14 | 2.00% | 2.52 | 300 | 2.7% | Paved areas and shallow paved swales | 20 | 3.29 | 1.52 | 4.04 | 314 | 15.15 | 5.00 | |



Runoff Calculations (Rational Method)

Project Information

Project Name: Parker MOB III
S.A. Project No: 18057
Revised Date: 10/15/2018
Calculated By: DAT

Intensity Equation

$$I = 28.5 (P_1)/(10+T_c)^{0.786}$$

*NOTE: P & Intensity Equation from UDFCD Criteria Manual

| Basin Designation | Area (ac.) | 'c' | cA | t _c (min) | P ₁ | intensity (in/hr) | Q (cfs) | |
|-------------------|------------|------|------|----------------------|----------------|-------------------|---------|--------|
| E1 | 0.54 | 0.72 | 0.39 | 8.99 | 0.99 | 2.79 | 1.08 | 02 YR |
| | | 0.77 | 0.42 | | 1.39 | 3.92 | 1.63 | 05 YR |
| | | 0.80 | 0.43 | | 1.64 | 4.62 | 1.99 | 10 YR |
| | | 0.84 | 0.45 | | 2.60 | 7.33 | 3.33 | 100 YR |
| E2 | 0.53 | 0.01 | 0.01 | 8.68 | 0.99 | 2.83 | 0.02 | 02 YR |
| | | 0.05 | 0.03 | | 1.39 | 3.97 | 0.11 | 05 YR |
| | | 0.15 | 0.08 | | 1.64 | 4.68 | 0.37 | 10 YR |
| | | 0.49 | 0.26 | | 2.60 | 7.42 | 1.95 | 100 YR |
| E3 | 0.21 | 0.57 | 0.12 | 5.00 | 0.99 | 3.36 | 0.40 | 02 YR |
| | | 0.63 | 0.13 | | 1.39 | 4.71 | 0.63 | 05 YR |
| | | 0.67 | 0.14 | | 1.64 | 5.56 | 0.78 | 10 YR |
| | | 0.77 | 0.16 | | 2.60 | 8.82 | 1.44 | 100 YR |
| E4 | 0.33 | 0.57 | 0.19 | 8.15 | 0.99 | 2.89 | 0.55 | 02 YR |
| | | 0.63 | 0.21 | | 1.39 | 4.06 | 0.86 | 05 YR |
| | | 0.67 | 0.22 | | 1.64 | 4.79 | 1.07 | 10 YR |
| | | 0.78 | 0.26 | | 2.60 | 7.59 | 1.96 | 100 YR |
| E5 | 0.38 | 0.56 | 0.21 | 7.89 | 0.99 | 2.92 | 0.62 | 02 YR |
| | | 0.62 | 0.24 | | 1.39 | 4.10 | 0.97 | 05 YR |
| | | 0.66 | 0.25 | | 1.64 | 4.84 | 1.21 | 10 YR |
| | | 0.77 | 0.29 | | 2.60 | 7.68 | 2.24 | 100 YR |
| E6 | 0.27 | 0.01 | 0.00 | 5.96 | 0.99 | 3.20 | 0.01 | 02 YR |
| | | 0.05 | 0.01 | | 1.39 | 4.49 | 0.06 | 05 YR |
| | | 0.15 | 0.04 | | 1.64 | 5.30 | 0.21 | 10 YR |
| | | 0.49 | 0.13 | | 2.60 | 8.40 | 1.10 | 100 YR |
| E7 | 0.72 | 0.46 | 0.33 | 10.79 | 0.99 | 2.60 | 0.86 | 02 YR |
| | | 0.53 | 0.38 | | 1.39 | 3.65 | 1.39 | 05 YR |
| | | 0.58 | 0.42 | | 1.64 | 4.30 | 1.79 | 10 YR |
| | | 0.73 | 0.52 | | 2.60 | 6.82 | 3.56 | 100 YR |
| E8 | 0.10 | 0.55 | 0.06 | 7.41 | 0.99 | 2.99 | 0.17 | 02 YR |
| | | 0.61 | 0.06 | | 1.39 | 4.19 | 0.27 | 05 YR |
| | | 0.65 | 0.07 | | 1.64 | 4.95 | 0.34 | 10 YR |
| | | 0.77 | 0.08 | | 2.60 | 7.84 | 0.63 | 100 YR |
| E9 | 0.63 | 0.75 | 0.47 | 6.03 | 0.99 | 3.19 | 1.50 | 02 YR |
| | | 0.80 | 0.50 | | 1.39 | 4.47 | 2.24 | 05 YR |
| | | 0.82 | 0.52 | | 1.64 | 5.28 | 2.72 | 10 YR |
| | | 0.86 | 0.54 | | 2.60 | 8.37 | 4.50 | 100 YR |
| E10 | 0.50 | 0.71 | 0.35 | 6.27 | 0.99 | 3.15 | 1.11 | 02 YR |
| | | 0.76 | 0.38 | | 1.39 | 4.42 | 1.67 | 05 YR |
| | | 0.79 | 0.39 | | 1.64 | 5.22 | 2.04 | 10 YR |
| | | 0.84 | 0.42 | | 2.60 | 8.27 | 3.44 | 100 YR |
| E11 | 0.63 | 0.78 | 0.49 | 5.10 | 0.99 | 3.34 | 1.65 | 02 YR |
| | | 0.83 | 0.52 | | 1.39 | 4.69 | 2.46 | 05 YR |
| | | 0.85 | 0.54 | | 1.64 | 5.53 | 2.97 | 10 YR |
| | | 0.87 | 0.55 | | 2.60 | 8.77 | 4.83 | 100 YR |



Runoff Calculations (Rational Method)

Project Information

Project Name: Parker MOB III
S.A. Project No: 18057
Revised Date: 10/15/2018
Calculated By: DAT

Intensity Equation

$$I = 28.5 (P_1)/(10+T_c)^{0.786}$$

*NOTE: P & Intensity Equation from UDFCD Criteria Manual

| Basin Designation | Area (ac.) | 'c' | cA | t _c (min) | P ₁ | intensity (in/hr) | Q (cfs) | |
|-------------------|------------|------|------|----------------------|----------------|-------------------|---------|--------|
| E12 | 0.37 | 0.81 | 0.30 | 5.00 | 0.99 | 3.36 | 1.01 | 02 YR |
| | | 0.86 | 0.32 | | 1.39 | 4.71 | 1.49 | 05 YR |
| | | 0.87 | 0.32 | | 1.64 | 5.56 | 1.79 | 10 YR |
| | | 0.88 | 0.33 | | 2.60 | 8.82 | 2.88 | 100 YR |
| E13 | 0.28 | 0.68 | 0.19 | 5.00 | 0.99 | 3.36 | 0.65 | 02 YR |
| | | 0.74 | 0.21 | | 1.39 | 4.71 | 0.98 | 05 YR |
| | | 0.77 | 0.22 | | 1.64 | 5.56 | 1.20 | 10 YR |
| | | 0.83 | 0.23 | | 2.60 | 8.82 | 2.05 | 100 YR |
| E14 | 0.49 | 0.78 | 0.38 | 5.13 | 0.99 | 3.34 | 1.28 | 02 YR |
| | | 0.83 | 0.41 | | 1.39 | 4.68 | 1.90 | 05 YR |
| | | 0.85 | 0.42 | | 1.64 | 5.53 | 2.30 | 10 YR |
| | | 0.87 | 0.43 | | 2.60 | 8.76 | 3.74 | 100 YR |
| E15 | 0.35 | 0.27 | 0.09 | 5.00 | 0.99 | 3.36 | 0.32 | 02 YR |
| | | 0.34 | 0.12 | | 1.39 | 4.71 | 0.56 | 05 YR |
| | | 0.41 | 0.14 | | 1.64 | 5.56 | 0.80 | 10 YR |
| | | 0.63 | 0.22 | | 2.60 | 8.82 | 1.96 | 100 YR |
| F1 | 1.90 | 0.01 | 0.02 | 16.02 | 0.99 | 2.18 | 0.04 | 02 YR |
| | | 0.05 | 0.10 | | 1.39 | 3.06 | 0.30 | 05 YR |
| | | 0.15 | 0.28 | | 1.64 | 3.61 | 1.01 | 10 YR |
| | | 0.49 | 0.93 | | 2.60 | 5.72 | 5.34 | 100 YR |
| DA1 | 0.66 | 0.56 | 0.37 | 7.85 | 0.99 | 2.93 | 1.08 | 02 YR |
| | | 0.62 | 0.41 | | 1.39 | 4.11 | 1.69 | 05 YR |
| | | 0.66 | 0.44 | | 1.64 | 4.85 | 2.12 | 10 YR |
| | | 0.77 | 0.51 | | 2.60 | 7.69 | 3.91 | 100 YR |
| DA2 | 0.47 | 0.77 | 0.36 | 5.00 | 0.99 | 3.36 | 1.21 | 02 YR |
| | | 0.81 | 0.38 | | 1.39 | 4.71 | 1.81 | 05 YR |
| | | 0.84 | 0.39 | | 1.64 | 5.56 | 2.19 | 10 YR |
| | | 0.86 | 0.41 | | 2.60 | 8.82 | 3.58 | 100 YR |
| DA7 | 0.19 | 0.78 | 0.15 | 5.00 | 0.99 | 3.36 | 0.49 | 02 YR |
| | | 0.82 | 0.16 | | 1.39 | 4.71 | 0.74 | 05 YR |
| | | 0.84 | 0.16 | | 1.64 | 5.56 | 0.89 | 10 YR |
| | | 0.87 | 0.16 | | 2.60 | 8.82 | 1.45 | 100 YR |



Runoff Calculations (Rational Method)

Project Information

Project Name: Parker MOB III
S.A. Project No: 18057
Revised Date: 10/15/2018
Calculated By: DAT

Intensity Equation

$$I = 28.5 (P_1) / (10 + T_c)^{0.786}$$

*NOTE: P & Intensity Equation from UDFCD Criteria Manual

| Basin Designation | Area (ac.) | 'c' | cA | t _c (min) | P ₁ | intensity (in/hr) | Q (cfs) | |
|-------------------|------------|------|------|----------------------|----------------|-------------------|---------|--------|
| DA8 | 0.48 | 0.71 | 0.34 | 5.00 | 0.99 | 3.36 | 1.14 | 02 YR |
| | | 0.76 | 0.36 | | 1.39 | 4.71 | 1.72 | 05 YR |
| | | 0.78 | 0.38 | | 1.64 | 5.56 | 2.10 | 10 YR |
| | | 0.84 | 0.40 | | 2.60 | 8.82 | 3.54 | 100 YR |
| DA9 | 0.08 | 0.58 | 0.05 | 5.00 | 0.99 | 3.36 | 0.16 | 02 YR |
| | | 0.65 | 0.05 | | 1.39 | 4.71 | 0.24 | 05 YR |
| | | 0.68 | 0.05 | | 1.64 | 5.56 | 0.30 | 10 YR |
| | | 0.78 | 0.06 | | 2.60 | 8.82 | 0.55 | 100 YR |
| DA10 | 1.17 | 0.80 | 0.94 | 5.00 | 0.99 | 3.36 | 3.15 | 02 YR |
| | | 0.85 | 0.99 | | 1.39 | 4.71 | 4.67 | 05 YR |
| | | 0.86 | 1.01 | | 1.64 | 5.56 | 5.63 | 10 YR |
| | | 0.88 | 1.03 | | 2.60 | 8.82 | 9.08 | 100 YR |
| DA11 | 0.03 | 0.03 | 0.00 | 10.67 | 0.99 | 2.61 | 0.00 | 02 YR |
| | | 0.08 | 0.00 | | 1.39 | 3.66 | 0.01 | 05 YR |
| | | 0.18 | 0.01 | | 1.64 | 4.32 | 0.02 | 10 YR |
| | | 0.51 | 0.02 | | 2.60 | 6.85 | 0.10 | 100 YR |
| DA15 | 0.05 | 0.15 | 0.01 | 12.46 | 0.99 | 2.45 | 0.02 | 02 YR |
| | | 0.21 | 0.01 | | 1.39 | 3.43 | 0.04 | 05 YR |
| | | 0.29 | 0.01 | | 1.64 | 4.05 | 0.06 | 10 YR |
| | | 0.57 | 0.03 | | 2.60 | 6.42 | 0.18 | 100 YR |
| DA16 | 0.08 | 0.44 | 0.04 | 6.82 | 0.99 | 3.07 | 0.11 | 02 YR |
| | | 0.51 | 0.04 | | 1.39 | 4.31 | 0.18 | 05 YR |
| | | 0.56 | 0.04 | | 1.64 | 5.08 | 0.23 | 10 YR |
| | | 0.72 | 0.06 | | 2.60 | 8.06 | 0.46 | 100 YR |
| F3 | 0.36 | 0.54 | 0.19 | 5.00 | 0.99 | 3.36 | 0.65 | 02 YR |
| | | 0.61 | 0.22 | | 1.39 | 4.71 | 1.03 | 05 YR |
| | | 0.65 | 0.23 | | 1.64 | 5.56 | 1.30 | 10 YR |
| | | 0.76 | 0.27 | | 2.60 | 8.82 | 2.42 | 100 YR |
| F4 | 0.69 | 0.57 | 0.40 | 5.00 | 0.99 | 3.36 | 1.33 | 02 YR |
| | | 0.64 | 0.44 | | 1.39 | 4.71 | 2.08 | 05 YR |
| | | 0.68 | 0.47 | | 1.64 | 5.56 | 2.60 | 10 YR |
| | | 0.78 | 0.54 | | 2.60 | 8.82 | 4.74 | 100 YR |



Storm Sewer Routing

Project Information
 Project Name: Parker MOB III
 Miro Project No: 18057
 Revised Date: 10/15/2018
 Calculated by: 18057

05 Yr Event

| Design Point | Basin(s) | Direct Runoff | | | | | | | Total Runoff | | | | | Travel Time (Pipe) | | | | | | | Remarks | |
|--------------|----------------------|---------------|------|----------|----------|---------|-----------|----------|--------------|--------------|---------|-----------|----------|--------------------|---------------|-----------|-------------|-------------|------------|-------------------|---------|----------|
| | | Area (ac.) | C5 | tc (min) | cA (ac.) | P1 (in) | I (in/hr) | Q5 (cfs) | tc (min) | Σ (cA) (ac.) | P1 (in) | I (in/hr) | Q5 (cfs) | Design Flow (cfs) | Slope (ft/ft) | Size (in) | Length (ft) | Manning's n | Depth (in) | Velocity (ft/sec) | | tt (min) |
| | E1 | 0.54 | 0.77 | 8.99 | 0.42 | 1.39 | 3.92 | 1.63 | | | | | | 1.63 | | | | | | | | |
| | E2 | 0.53 | 0.05 | 8.68 | 0.03 | 1.39 | 3.97 | 0.11 | | | | | | 0.11 | | | | | | | | |
| | DA11 | 0.03 | 0.08 | 10.67 | 0.00 | 1.39 | 3.66 | 0.01 | | | | | | 0.01 | | | | | | | | |
| | DA15 | 0.05 | 0.21 | 12.46 | 0.01 | 1.39 | 3.43 | 0.04 | | | | | | 0.04 | | | | | | | | |
| | DA16 | 0.08 | 0.51 | 6.82 | 0.04 | 1.39 | 4.31 | 0.18 | | | | | | 0.18 | | | | | | | | |
| 1 | E+E2+DA11+D A15+DA16 | | | | | | | 1.71 | 12.46 | 0.50 | 1.39 | 3.43 | 1.71 | 1.71 | 0.022 | 24.00 | 36 | 0.013 | 5.3652 | 7.01 | 0.09 | |
| | E6 | 0.27 | 0.05 | 5.96 | 0.01 | 1.39 | 4.49 | 0.06 | | | | | | 0.06 | | | | | | | | |
| | E7 | 0.72 | 0.53 | 10.79 | 0.38 | 1.39 | 3.65 | 1.39 | | | | | | 1.39 | | | | | | | | |
| 2 | E6+E7 | | | | | | | 1.44 | 10.79 | 0.40 | 1.39 | 3.65 | 1.44 | 1.44 | 0.010 | 18.00 | 100 | 0.013 | 8.1204 | 5.68 | 0.29 | |
| | E8 | 0.10 | 0.61 | 7.41 | 0.06 | 1.39 | 4.19 | 0.27 | | | | | | 0.27 | | | | | | | | |
| 3 | DP2+E8 | | | | | | | 1.66 | 11.08 | 0.46 | 1.39 | 3.61 | 1.66 | 1.66 | 0.010 | 18.00 | 228 | 0.013 | 8.6244 | 5.84 | 0.65 | |
| | E4 | 0.33 | 0.63 | 8.15 | 0.21 | 1.39 | 4.06 | 0.86 | | | | | | 0.86 | | | | | | | | |
| 4 | DP3+E4 | | | | | | | 2.36 | 11.74 | 0.67 | 1.39 | 3.52 | 2.36 | 2.36 | 0.010 | 18.00 | 41 | 0.013 | 10.2048 | 6.25 | 0.11 | |
| | E5 | 0.38 | 0.62 | 7.89 | 0.24 | 1.39 | 4.10 | 0.97 | | | | | | 0.97 | | | | | | | | |
| 5 | DP4+E5 | | | | | | | 3.18 | 11.85 | 0.91 | 1.39 | 3.51 | 3.18 | 3.18 | 0.020 | 18.00 | 50 | 0.013 | 9.642 | 8.65 | 0.10 | |
| | DA1 | 0.66 | 0.62 | 7.85 | 0.41 | 1.39 | 4.11 | 1.69 | | | | | | 1.69 | | | | | | | | |
| 6 | DP5+DA1 | | | | | | | 4.60 | 11.94 | 1.32 | 1.39 | 3.50 | 4.60 | 4.60 | 0.031 | 18.00 | 63 | 0.013 | 10.3356 | 11.05 | 0.09 | |
| | E5 | 0.38 | 0.62 | 7.89 | 0.24 | 1.39 | 4.10 | 0.97 | | | | | | 0.97 | | | | | | | | |
| 7 | DP6+E5 | | | | | | | 5.41 | 12.04 | 1.55 | 1.39 | 3.48 | 5.41 | 5.41 | 0.070 | 18.00 | 41 | 0.013 | 8.8308 | 15.60 | 0.04 | |
| 8 | DP1+DP7 | | | | | | | 7.04 | 12.46 | 2.05 | 1.39 | 3.43 | 7.04 | 7.04 | 0.038 | 24.00 | 103 | 0.013 | 10.8564 | 13.34 | 0.13 | |
| | E12 | 0.37 | 0.86 | 5.00 | 0.32 | 1.39 | 4.71 | 1.49 | | | | | | 1.49 | | | | | | | | |
| | E13 | 0.28 | 0.74 | 5.00 | 0.21 | 1.39 | 4.71 | 0.98 | | | | | | 0.98 | | | | | | | | |
| | F1 | 1.90 | 0.05 | 16.02 | 0.10 | 1.39 | 3.06 | 0.30 | | | | | | 0.30 | | | | | | | | |
| 9 | E12+E13=F1 | | | | | | | 1.90 | 16.02 | 0.62 | 1.39 | 3.06 | 1.90 | 1.90 | 0.010 | 18.00 | 13 | 0.013 | 12.1584 | 6.60 | 0.03 | |
| | E14 | 0.49 | 0.83 | 5.13 | 0.41 | 1.39 | 4.68 | 1.90 | | | | | | 1.90 | | | | | | | | |
| 10 | DP9+E14 | | | | | | | 3.14 | 16.05 | 1.03 | 1.39 | 3.06 | 3.14 | 3.14 | 0.020 | 18.00 | 26 | 0.013 | 11.3832 | 9.17 | 0.05 | |
| 11 | DP9+DP10 | | | | | | | 3.13 | 16.10 | 1.03 | 1.39 | 3.05 | 3.13 | 3.13 | 0.028 | 18.00 | 176 | 0.013 | 10.1892 | 10.45 | 0.28 | |
| | E11 | 0.63 | 0.83 | 5.10 | 0.52 | 1.39 | 4.69 | 2.46 | | | | | | 2.46 | | | | | | | | |
| 12 | DP11+E11 | | | | | | | 4.69 | 16.38 | 1.55 | 1.39 | 3.03 | 4.69 | 4.69 | 0.024 | 18.00 | 37 | 0.013 | 12.7152 | 10.33 | 0.06 | |
| | E9 | 0.63 | 0.80 | 6.03 | 0.50 | 1.39 | 4.47 | 2.24 | | | | | | 2.24 | | | | | | | | |
| | E10 | 0.50 | 0.76 | 6.27 | 0.38 | 1.39 | 4.42 | 1.67 | | | | | | 1.67 | | | | | | | | |
| 14 | DP12+E9+E10 | | | | | | | 7.34 | 16.44 | 2.43 | 1.39 | 3.02 | 7.34 | 7.34 | 0.010 | 24.00 | 190 | 0.013 | 16.914 | 8.07 | 0.39 | |
| | DA1 | 0.66 | 0.62 | 7.85 | 0.41 | 1.39 | 4.11 | 1.69 | | | | | | 1.69 | | | | | | | | |
| | DA2 | 0.47 | 0.81 | 5.00 | 0.38 | 1.39 | 4.71 | 1.81 | | | | | | 1.81 | | | | | | | | |
| | DA7 | 0.19 | 0.82 | 5.00 | 0.16 | 1.39 | 4.71 | 0.74 | | | | | | 0.74 | | | | | | | | |
| | DA8 | 0.48 | 0.76 | 5.00 | 0.36 | 1.39 | 4.71 | 1.72 | | | | | | 1.72 | | | | | | | | |
| | DA9 | 0.08 | 0.65 | 5.00 | 0.05 | 1.39 | 4.71 | 0.24 | | | | | | 0.24 | | | | | | | | |
| | DA10 | 1.17 | 0.85 | 5.00 | 0.99 | 1.39 | 4.71 | 4.67 | | | | | | 4.67 | | | | | | | | |
| | F4 | 0.69 | 0.64 | 5.00 | 0.44 | 1.39 | 4.71 | 2.08 | | | | | | 2.08 | | | | | | | | |
| | F3 | 0.36 | 0.61 | 5.00 | 0.22 | 1.39 | 4.71 | 1.03 | | | | | | 1.03 | | | | | | | | |
| 15 | BASIN B | | | | | | | 22.37 | 16.83 | 7.49 | 1.39 | 2.99 | 22.37 | 22.37 | 0.036 | 36.00 | 70 | 0.013 | 16.3584 | 17.16 | 0.07 | |



Storm Sewer Routing

Project Information
 Project Name: Parker MOB III
 Miro Project No: 18057
 Revised Date: 10/15/2018
 Calculated by: 18057

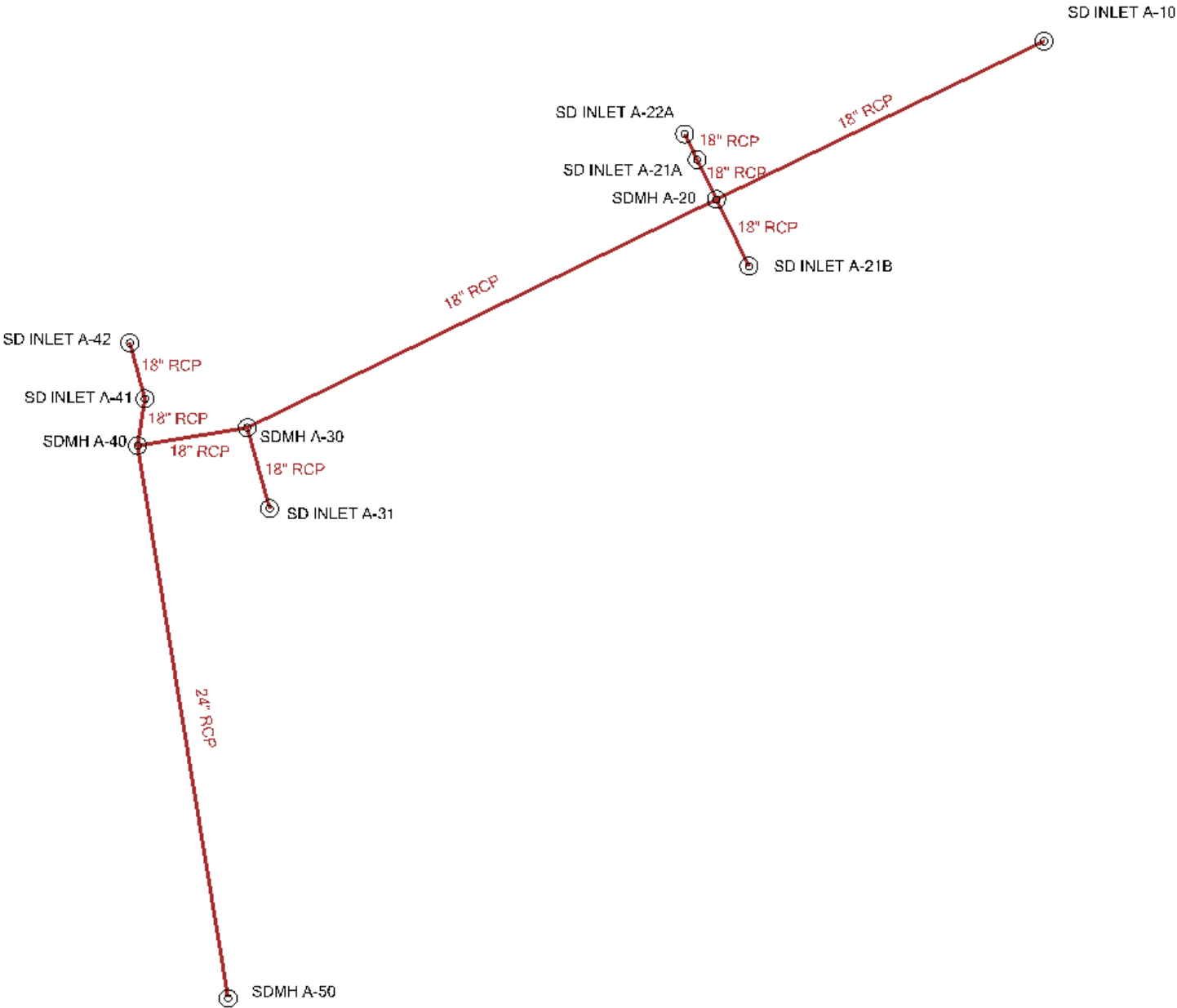
100 Yr Event

| Design Point | Basin(s) | Direct Runoff | | | | | | | Total Runoff | | | | | Travel Time (Pipe) | | | | | | | Remarks | |
|--------------|-------------------------|---------------|------|----------|----------|---------|-----------|------------|--------------|--------------|---------|-----------|------------|--------------------|---------------|-----------|-------------|-------------|------------|-------------------|---------|----------|
| | | Area (ac.) | C100 | tc (min) | cA (ac.) | P1 (in) | I (in/hr) | Q100 (cfs) | tc (min) | Σ (cA) (ac.) | P1 (in) | I (in/hr) | Q100 (cfs) | Design Flow (cfs) | Slope (ft/ft) | Size (in) | Length (ft) | Manning's n | Depth (in) | Velocity (ft/sec) | | tt (min) |
| | E1 | 0.54 | 0.84 | 8.99 | 0.45 | 2.60 | 7.33 | 3.33 | | | | | | | | | | | | | | |
| | E2 | 0.53 | 0.49 | 8.68 | 0.26 | 2.60 | 7.42 | 1.95 | | | | | | | | | | | | | | |
| | DA11 | 0.03 | 0.51 | 10.67 | 0.02 | 2.60 | 6.85 | 0.10 | | | | | | | | | | | | | | |
| | DA15 | 0.05 | 0.57 | 12.46 | 0.03 | 2.60 | 6.42 | 0.18 | | | | | | | | | | | | | | |
| | DA16 | 0.08 | 0.72 | 6.82 | 0.06 | 2.60 | 8.06 | 0.46 | | | | | | | | | | | | | | |
| 1 | E+E2+DA11+D A15+DA16 | | | | | | | 5.25 | 12.46 | 0.82 | 2.60 | 6.42 | 5.25 | 5.25 | 0.022 | 24.00 | 36 | 0.013 | 5.3652 | 7.01 | 0.09 | |
| | E6 | 0.27 | 0.49 | 5.96 | 0.13 | 2.60 | 8.40 | 1.10 | | | | | | | | | | | | | | |
| | E7 | 0.72 | 0.73 | 10.79 | 0.52 | 2.60 | 6.82 | 3.56 | | | | | | | | | | | | | | |
| 2 | E6+E7 | | | | | | | 4.45 | 10.79 | 0.65 | 2.60 | 6.82 | 4.45 | 4.45 | 0.010 | 18.00 | 100 | 0.013 | 8.1204 | 5.68 | 0.29 | |
| | E8 | 0.10 | 0.77 | 7.41 | 0.08 | 2.60 | 7.84 | 0.63 | | | | | | | | | | | | | | |
| 3 | DP2+E8 | | | | | | | 4.94 | 11.08 | 0.73 | 2.60 | 6.75 | 4.94 | 4.94 | 0.010 | 18.00 | 228 | 0.013 | 8.6244 | 5.84 | 0.65 | |
| | E4 | 0.33 | 0.78 | 8.15 | 0.26 | 2.60 | 7.59 | 1.96 | | | | | | | | | | | | | | |
| 4 | DP3+E4 | | | | | | | 6.52 | 11.74 | 0.99 | 2.60 | 6.59 | 6.52 | 6.52 | 0.010 | 18.00 | 41 | 0.013 | 10.2048 | 6.25 | 0.11 | |
| | E5 | 0.38 | 0.77 | 7.89 | 0.29 | 2.60 | 7.68 | 2.24 | | | | | | | | | | | | | | |
| 5 | DP4+E5 | | | | | | | 8.41 | 11.85 | 1.28 | 2.60 | 6.56 | 8.41 | 8.41 | 0.020 | 18.00 | 50 | 0.013 | 9.642 | 8.65 | 0.10 | |
| | DA1 | 0.66 | 0.77 | 7.85 | 0.51 | 2.60 | 7.69 | 3.91 | | | | | | | | | | | | | | |
| 6 | DP5+DA1 | | | | | | | 11.71 | 11.94 | 1.79 | 2.60 | 6.54 | 11.71 | 11.71 | 0.031 | 18.00 | 63 | 0.013 | 10.3356 | 11.05 | 0.09 | |
| | E5 | 0.38 | 0.77 | 7.89 | 0.29 | 2.60 | 7.68 | 2.24 | | | | | | | | | | | | | | |
| 7 | DP6+E5 | | | | | | | 13.57 | 12.04 | 2.08 | 2.60 | 6.52 | 13.57 | 13.57 | 0.070 | 18.00 | 41 | 0.013 | 8.8308 | 15.60 | 0.04 | |
| 8 | DP1+DP7 | | | | | | | 18.63 | 12.46 | 2.90 | 2.60 | 6.42 | 18.63 | 18.63 | 0.038 | 24.00 | 103 | 0.013 | 10.8564 | 13.34 | 0.13 | |
| | E12 | 0.37 | 0.88 | 5.00 | 0.33 | 2.60 | 8.82 | 2.88 | | | | | | | | | | | | | | |
| | E13 | 0.28 | 0.83 | 5.00 | 0.23 | 2.60 | 8.82 | 2.05 | | | | | | | | | | | | | | |
| | F1 | 1.90 | 0.49 | 16.02 | 0.93 | 2.60 | 5.72 | 5.34 | | | | | | | | | | | | | | |
| 9 | E12+E13=F1 | | | | | | | 8.54 | 16.02 | 1.49 | 2.60 | 5.72 | 8.54 | 8.54 | 0.010 | 18.00 | 13 | 0.013 | 12.1584 | 6.60 | 0.03 | |
| | E14 | 0.49 | 0.87 | 5.13 | 0.43 | 2.60 | 8.76 | 3.74 | | | | | | | | | | | | | | |
| 10 | DP9+E14 | | | | | | | 10.97 | 16.05 | 1.92 | 2.60 | 5.71 | 10.97 | 10.97 | 0.020 | 18.00 | 26 | 0.013 | 11.3832 | 9.17 | 0.05 | |
| 11 | DP9+DP10 | | | | | | | 10.95 | 16.10 | 1.92 | 2.60 | 5.71 | 10.95 | 10.95 | 0.028 | 18.00 | 176 | 0.013 | 10.1892 | 10.45 | 0.28 | |
| | E11 | 0.63 | 0.87 | 5.10 | 0.55 | 2.60 | 8.77 | 4.83 | | | | | | | | | | | | | | |
| 12 | DP11+E11 | | | | | | | 13.98 | 16.38 | 2.47 | 2.60 | 5.66 | 13.98 | 13.98 | 0.024 | 18.00 | 37 | 0.013 | 12.7152 | 10.33 | 0.06 | |
| | E9 | 0.63 | 0.86 | 6.03 | 0.54 | 2.60 | 8.37 | 4.50 | | | | | | | | | | | | | | |
| | E10 | 0.50 | 0.84 | 6.27 | 0.42 | 2.60 | 8.27 | 3.44 | | | | | | | | | | | | | | |
| 14 | DP12+E9+E10 | | | | | | | 19.34 | 16.44 | 3.42 | 2.60 | 5.65 | 19.34 | 19.34 | 0.010 | 24.00 | 190 | 0.013 | 16.914 | 8.07 | 0.39 | |
| | DA1 | 0.66 | 0.77 | 7.85 | 0.51 | 2.60 | 7.69 | 3.91 | | | | | | | | | | | | | | |
| | DA2 | 0.47 | 0.86 | 5.00 | 0.41 | 2.60 | 8.82 | 3.58 | | | | | | | | | | | | | | |
| | DA7 | 0.19 | 0.87 | 5.00 | 0.16 | 2.60 | 8.82 | 1.45 | | | | | | | | | | | | | | |
| | DA8 | 0.48 | 0.84 | 5.00 | 0.40 | 2.60 | 8.82 | 3.54 | | | | | | | | | | | | | | |
| | DA9 | 0.08 | 0.78 | 5.00 | 0.06 | 2.60 | 8.82 | 0.55 | | | | | | | | | | | | | | |
| | DA10 | 1.17 | 0.88 | 5.00 | 1.03 | 2.60 | 8.82 | 9.08 | | | | | | | | | | | | | | |
| | F4 | 0.69 | 0.78 | 5.00 | 0.54 | 2.60 | 8.82 | 4.74 | | | | | | | | | | | | | | |
| | F3 | 0.36 | 0.76 | 5.00 | 0.27 | 2.60 | 8.82 | 2.42 | | | | | | | | | | | | | | |
| 15 | BASIN B | | | | | | | 54.22 | 16.83 | 9.71 | 2.60 | 5.58 | 54.22 | 54.22 | 0.036 | 36.00 | 70 | 0.013 | 16.3584 | 17.16 | 0.07 | |

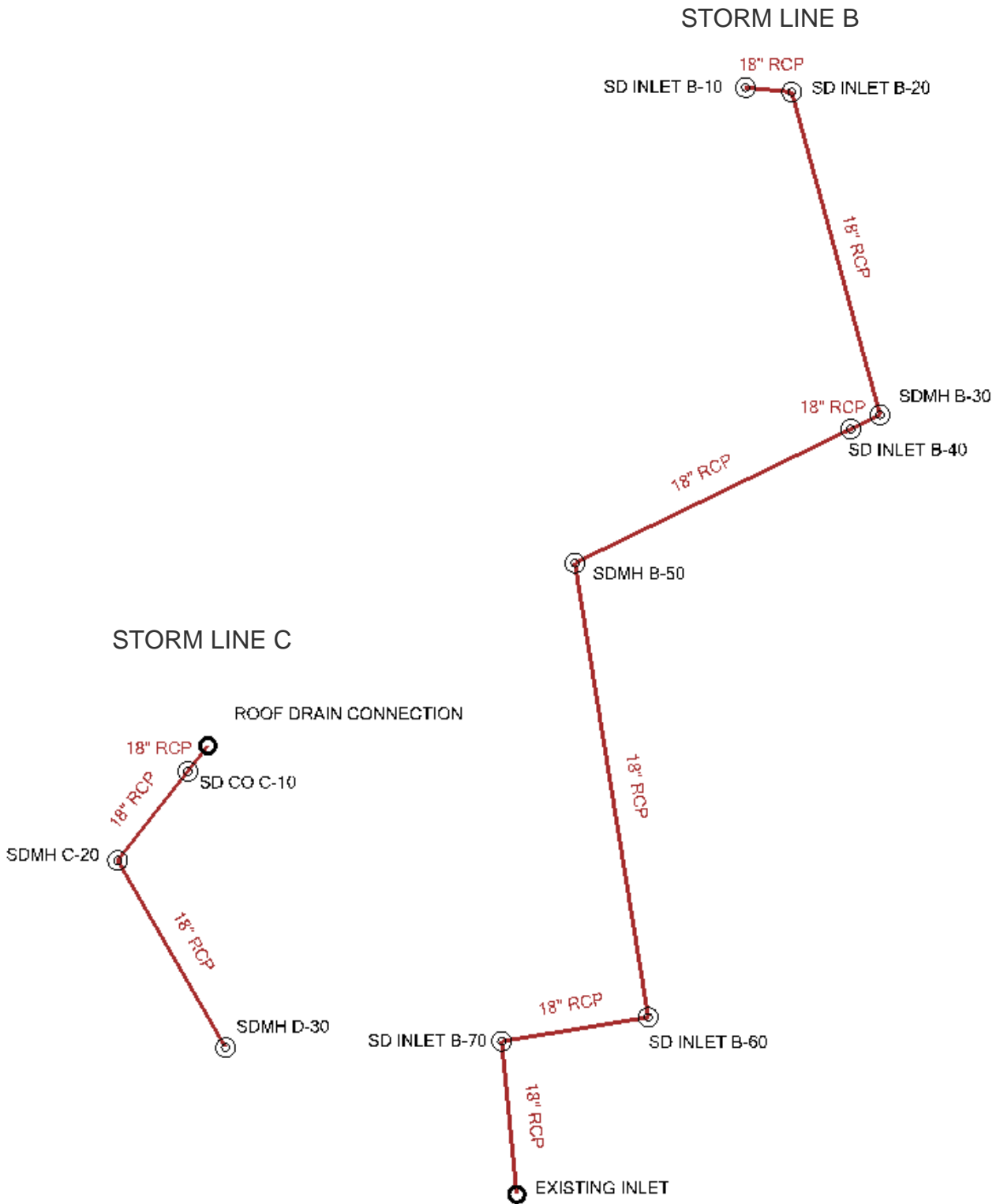
Appendix B
Hydraulic Calculations

Scenario: Base

STORM LINE A



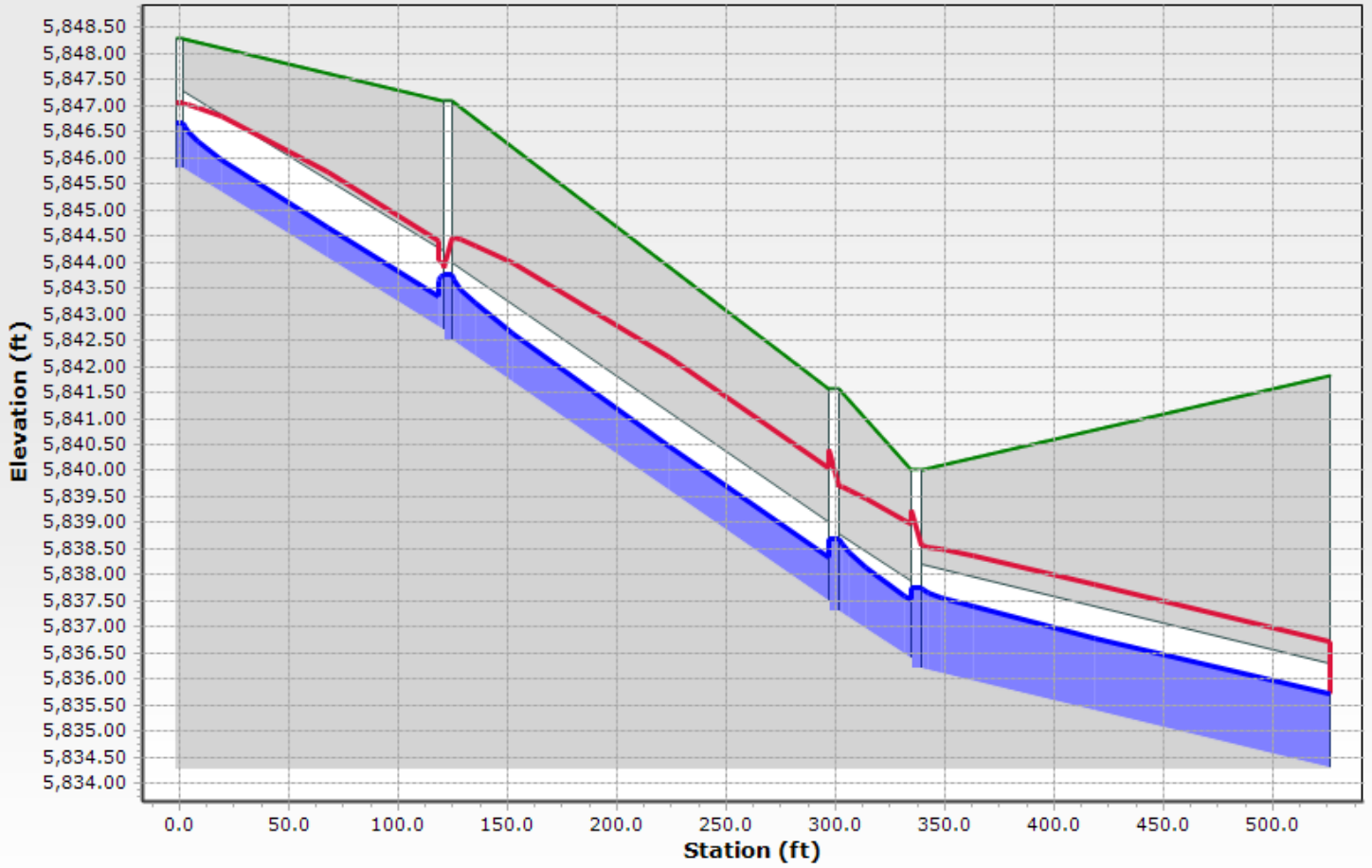
Scenario: Base



Profile Report

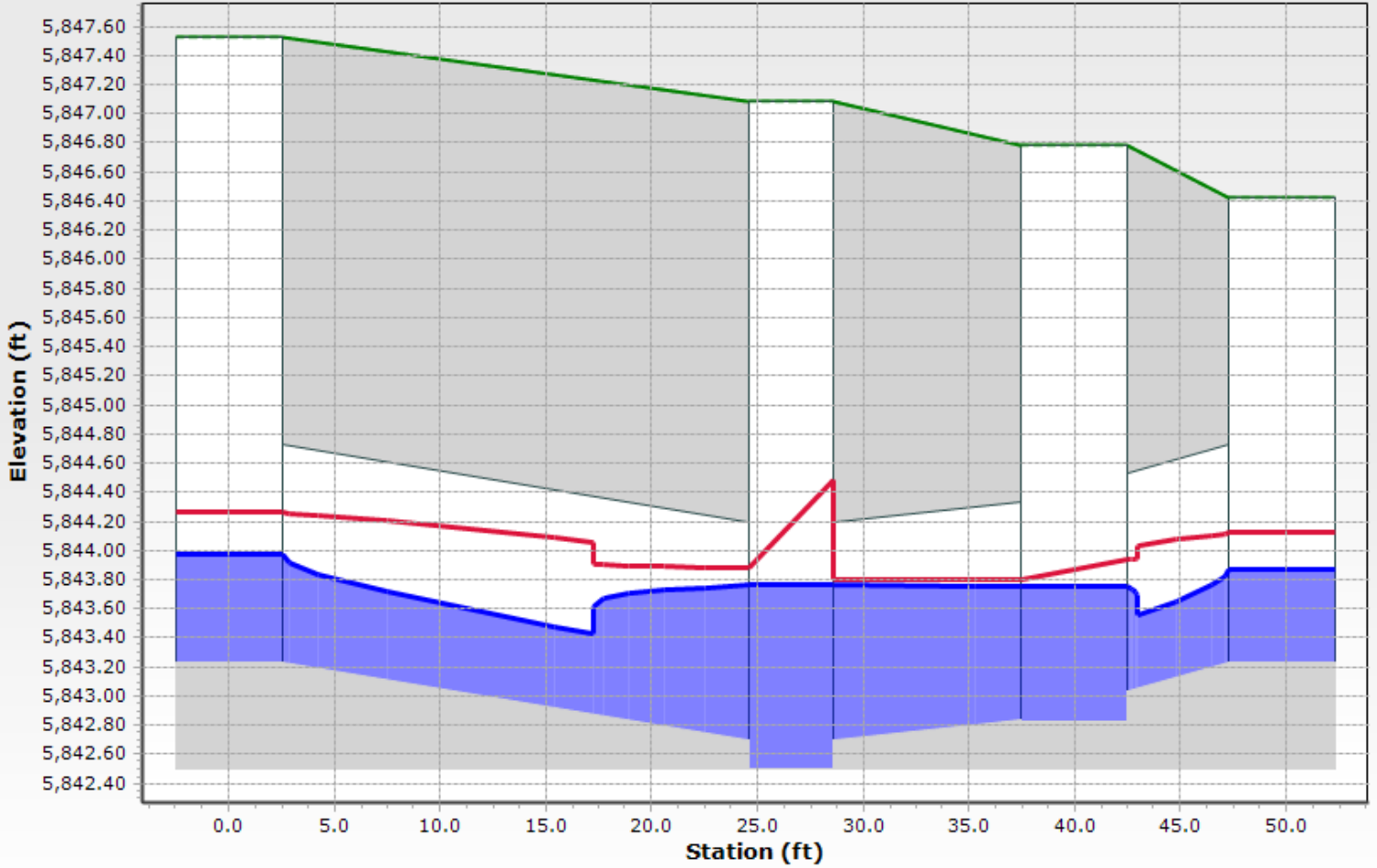
Profile: STORM LINE A

STORM LINE A - Base



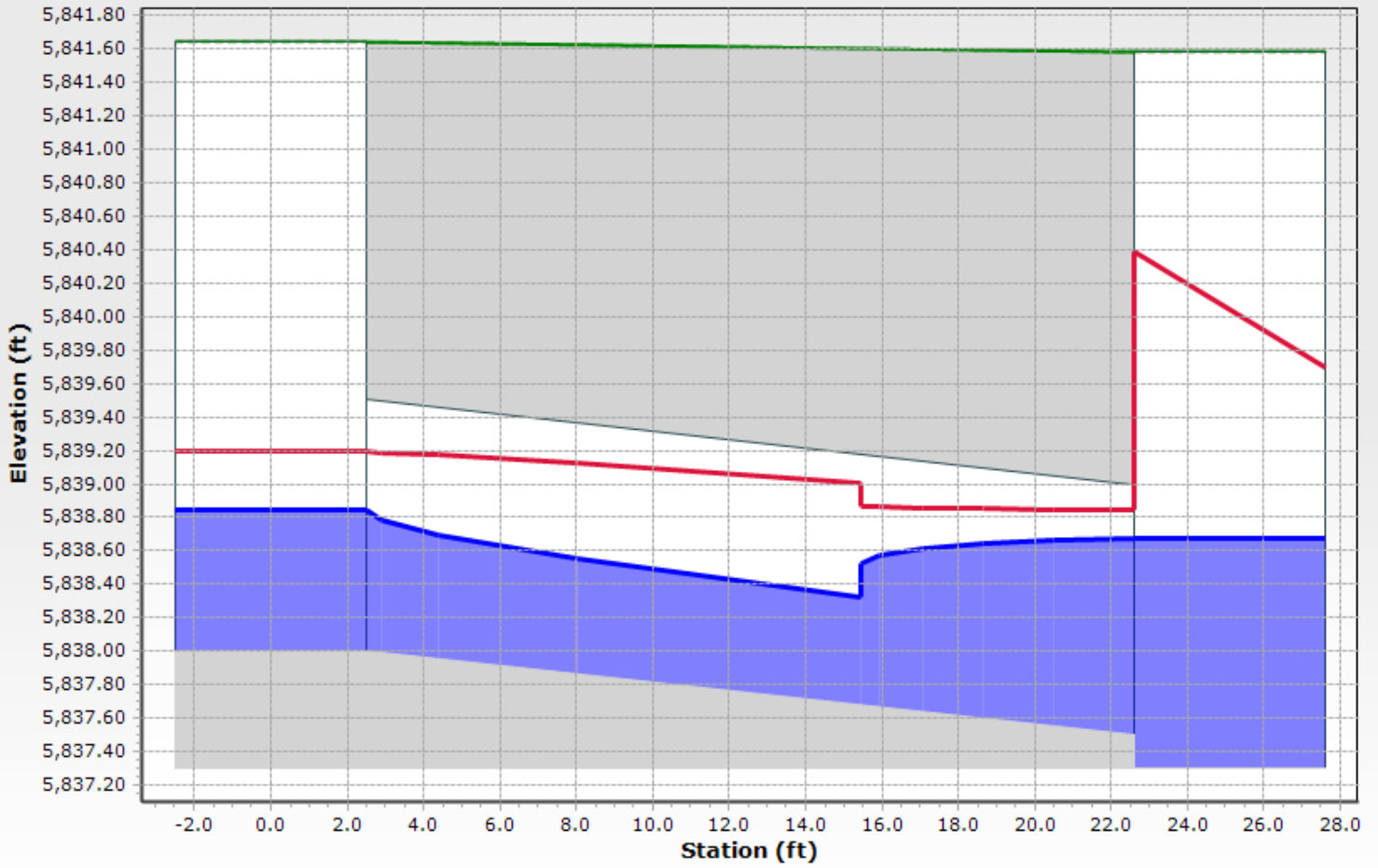
Profile Report
Profile: STORM LINE A-20

STORM LINE A-20 - Base



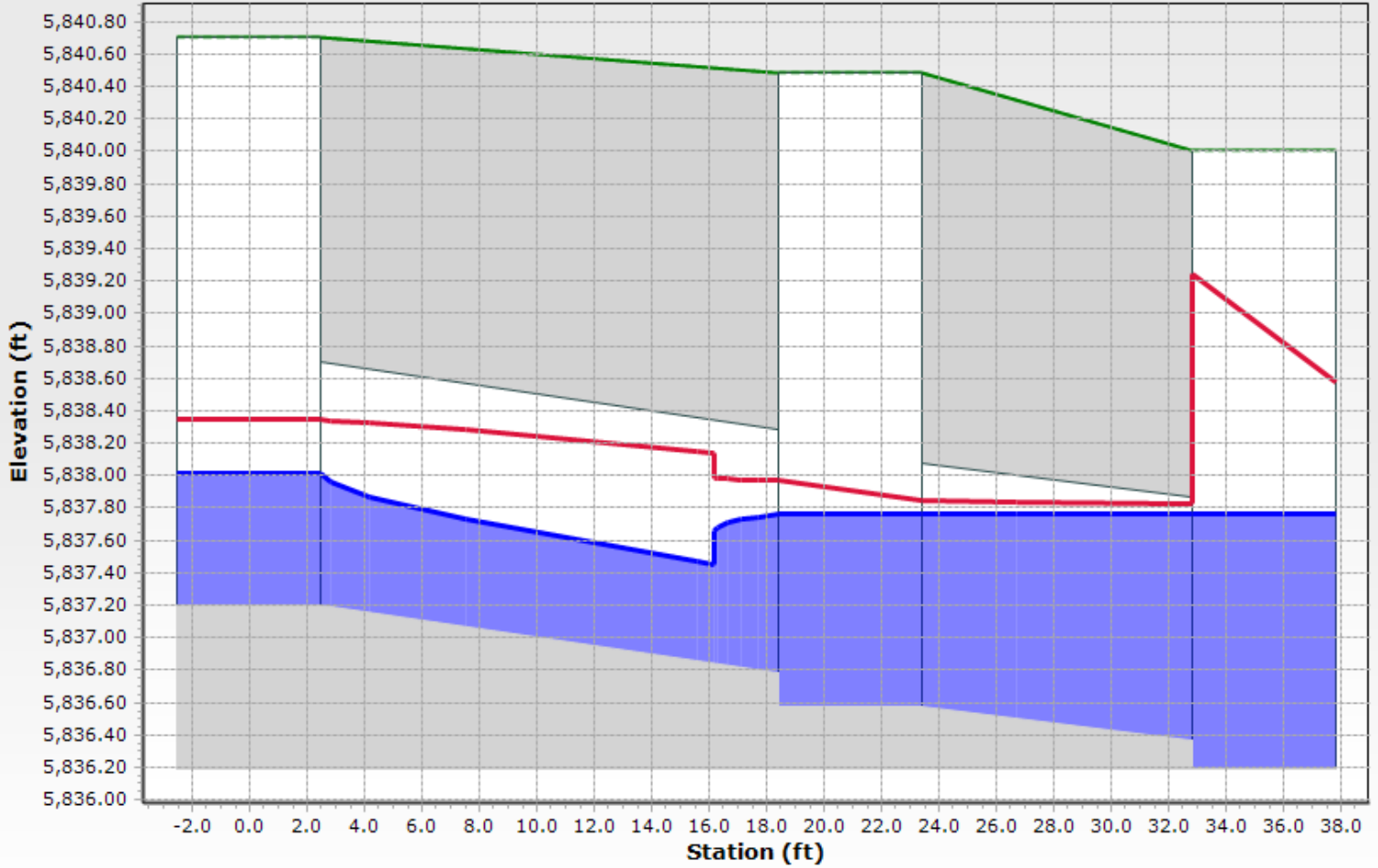
Profile Report
Profile: STORM LINE A-30

STORM LINE A-30 - Base



Profile Report
Profile: STORM LINE A-40

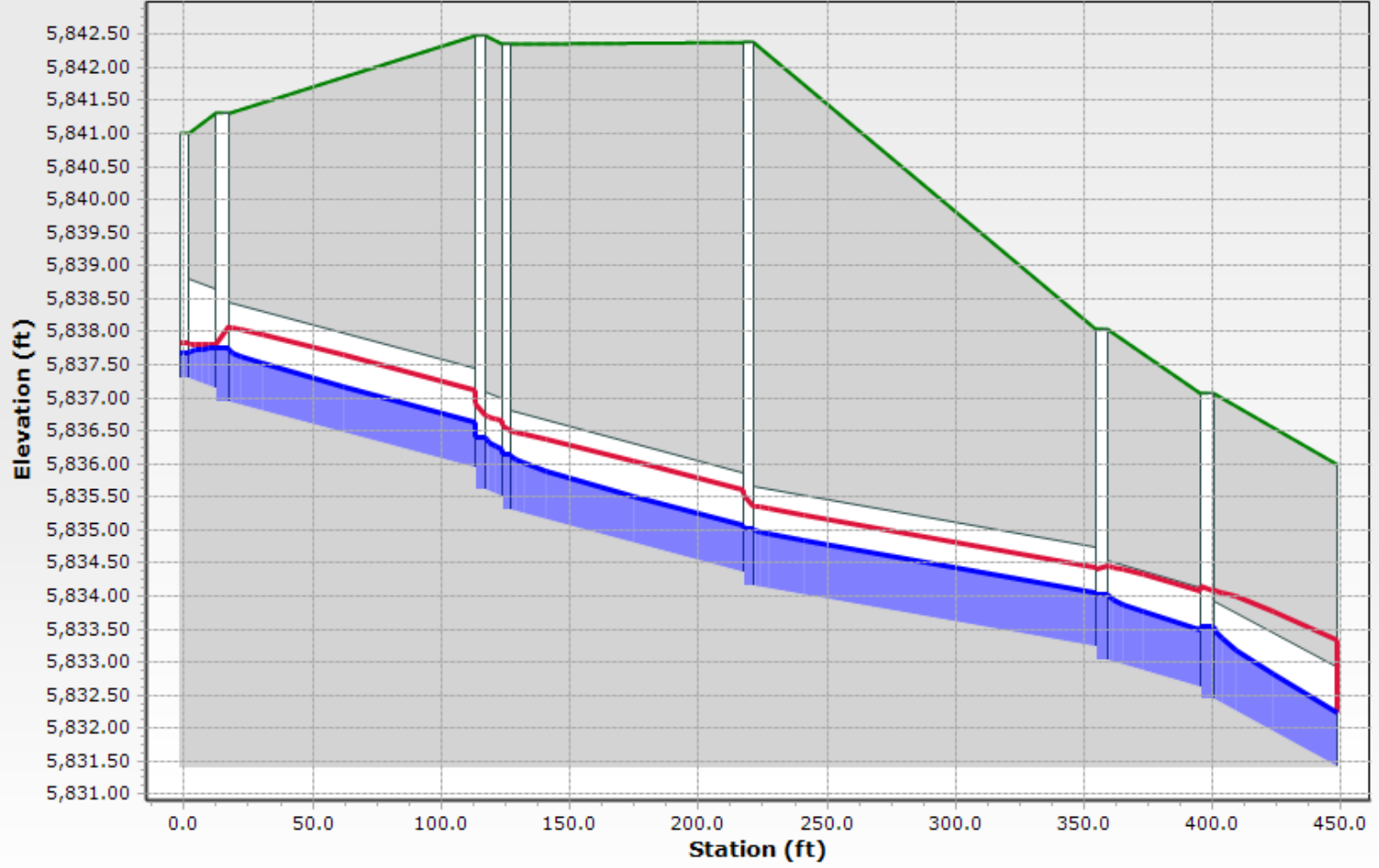
STORM LINE A-40 - Base



Profile Report

Profile: STORM LINE B

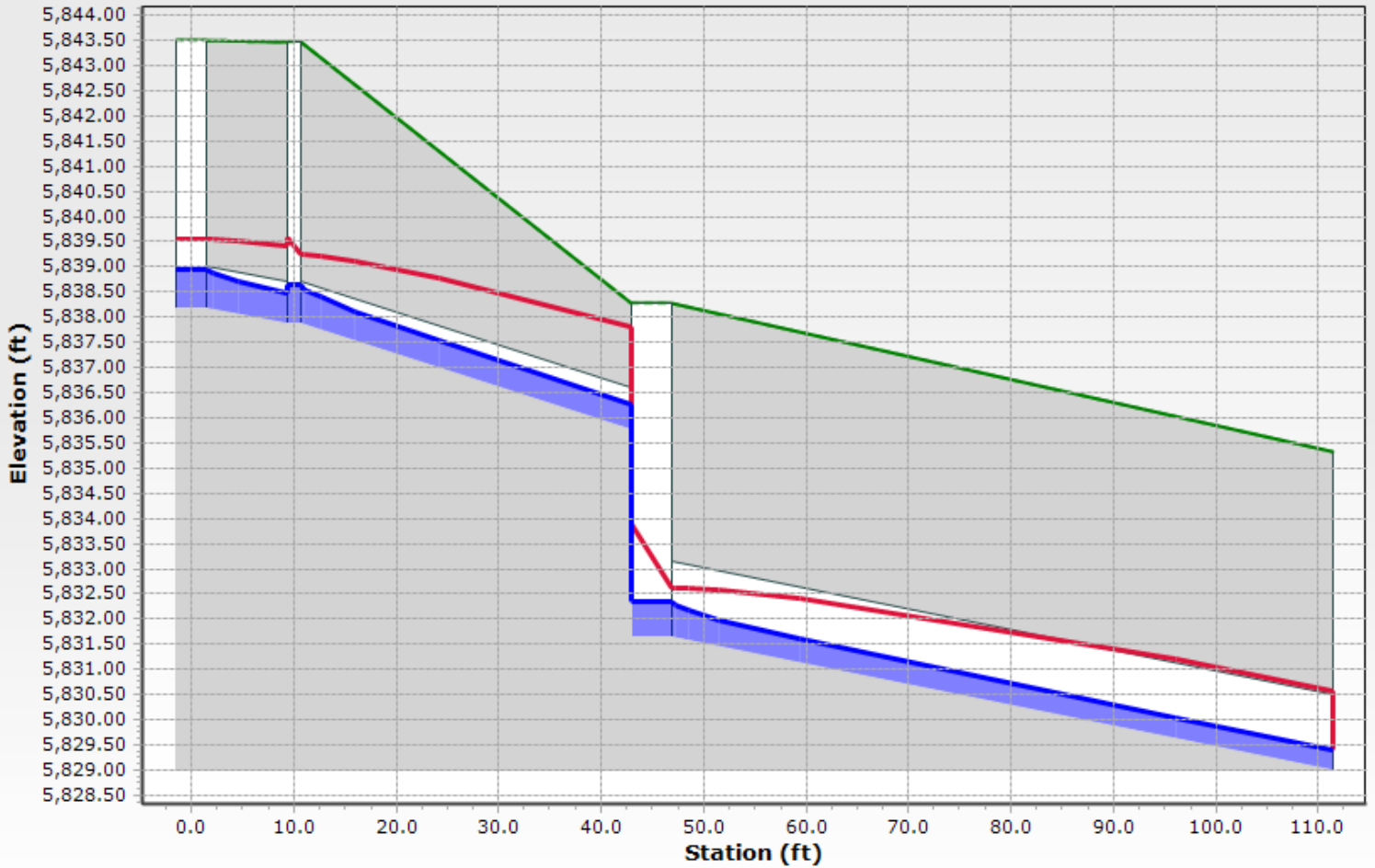
STORM LINE B - Base



Profile Report

Profile: STORM LINE C

STORM LINE C - Base



Scenario: Base
Current Time Step: 0.000Hr
FlexTable: Conduit Table

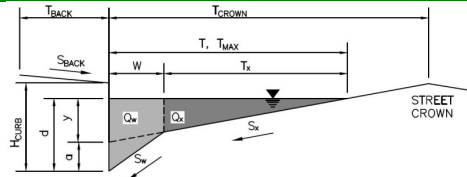
| Start Node | Invert (Start) (ft) | Stop Node | Invert (Stop) (ft) | Length (User Defined) (ft) | Slope (Calculated) (ft/ft) | Diameter (in) | Manning's n | Flow (cfs) | Velocity (ft/s) | Hydraulic Grade Line (Out) (ft) | Capacity (Full Flow) (cfs) |
|-----------------------|---------------------|----------------|--------------------|----------------------------|----------------------------|---------------|-------------|------------|-----------------|---------------------------------|----------------------------|
| SD INLET B-70 | 5,832.43 | EXISTING INLET | 5,831.42 | 50.5 | 0.020 | 18.0 | 0.013 | 8.34 | 8.65 | 5,832.25 | 14.85 |
| ROOF DRAIN CONNECTION | 5,838.17 | SD CO C-10 | 5,837.87 | 10.0 | 0.030 | 10.0 | 0.010 | 3.33 | 9.71 | 5,838.48 | 4.93 |
| SD INLET A-10 | 5,845.80 | SDMH A-20 | 5,842.70 | 122.9 | 0.025 | 18.0 | 0.013 | 5.22 | 8.34 | 5,843.76 | 16.67 |
| SD INLET A-21B | 5,843.23 | SDMH A-20 | 5,842.70 | 26.6 | 0.020 | 18.0 | 0.013 | 3.74 | 7.00 | 5,843.76 | 14.85 |
| SDMH A-20 | 5,842.50 | SDMH A-30 | 5,837.50 | 176.3 | 0.028 | 18.0 | 0.013 | 10.78 | 10.50 | 5,838.35 | 17.69 |
| SD INLET A-21A | 5,842.83 | SDMH A-20 | 5,842.70 | 13.4 | 0.010 | 18.0 | 0.013 | 2.05 | 4.61 | 5,843.76 | 10.50 |
| SD INLET A-22A | 5,843.23 | SD INLET A-21A | 5,843.03 | 9.8 | 0.020 | 18.0 | 0.013 | 2.88 | 6.51 | 5,843.75 | 14.85 |
| SD CO C-10 | 5,837.87 | SDMH C-20 | 5,835.78 | 34.9 | 0.060 | 10.0 | 0.013 | 3.33 | 10.36 | 5,836.27 | 5.36 |
| SD INLET B-20 | 5,836.95 | SDMH B-30 | 5,835.94 | 100.6 | 0.010 | 18.0 | 0.013 | 4.40 | 5.68 | 5,836.62 | 10.50 |
| SDMH B-30 | 5,835.60 | SD INLET B-40 | 5,835.50 | 10.0 | 0.010 | 18.0 | 0.013 | 4.40 | 5.68 | 5,836.21 | 10.50 |
| SD INLET B-40 | 5,835.30 | SDMH B-50 | 5,834.36 | 94.3 | 0.010 | 18.0 | 0.013 | 4.88 | 5.84 | 5,835.08 | 10.50 |
| SDMH B-50 | 5,834.16 | SD INLET B-60 | 5,833.24 | 137.4 | 0.007 | 18.0 | 0.013 | 4.88 | 5.02 | 5,834.05 | 8.60 |
| SDMH A-40 | 5,836.19 | SDMH A-50 | 5,834.30 | 189.2 | 0.010 | 24.0 | 0.013 | 19.11 | 8.07 | 5,835.71 | 22.62 |
| SD INLET A-31 | 5,838.00 | SDMH A-30 | 5,837.50 | 25.1 | 0.020 | 18.0 | 0.013 | 4.83 | 7.51 | 5,838.68 | 14.85 |
| SDMH A-30 | 5,837.30 | SDMH A-40 | 5,836.40 | 37.5 | 0.024 | 18.0 | 0.013 | 13.79 | 10.32 | 5,837.52 | 16.26 |
| SD INLET B-10 | 5,837.30 | SD INLET B-20 | 5,837.15 | 14.7 | 0.010 | 18.0 | 0.013 | 1.07 | 3.82 | 5,837.75 | 10.50 |
| SD INLET A-42 | 5,837.20 | SD INLET A-41 | 5,836.78 | 20.9 | 0.020 | 18.0 | 0.013 | 4.49 | 7.36 | 5,837.76 | 14.85 |
| SD INLET A-41 | 5,836.58 | SDMH A-40 | 5,836.37 | 14.4 | 0.015 | 18.0 | 0.013 | 3.43 | 6.10 | 5,837.77 | 12.68 |
| SDMH C-20 | 5,831.66 | SDMH C-30 | 5,829.00 | 66.5 | 0.040 | 18.0 | 0.013 | 3.33 | 8.68 | 5,829.40 | 21.00 |
| SD INLET B-60 | 5,833.04 | SD INLET B-70 | 5,832.63 | 40.9 | 0.010 | 18.0 | 0.013 | 6.46 | 6.25 | 5,833.48 | 10.50 |

UD Inlet Calculations

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Parker MOB III
 Inlet ID: Inlet A-21A



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb $T_{BACK} = 5.0$ ft

Side Slope Behind Curb (leave blank for no conveyance credit behind curb) $S_{BACK} = 0.020$ ft/ft

Manning's Roughness Behind Curb (typically between 0.012 and 0.020) $n_{BACK} = 0.013$

Height of Curb at Gutter Flow Line $H_{CURB} = 6.00$ inches

Distance from Curb Face to Street Crown $T_{CROWN} = 12.0$ ft

Gutter Width $W = 1.00$ ft

Street Transverse Slope $S_x = 0.020$ ft/ft

Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft) $S_w = 0.083$ ft/ft

Street Longitudinal Slope - Enter 0 for sump condition $S_o = 0.030$ ft/ft

Manning's Roughness for Street Section (typically between 0.012 and 0.020) $n_{STREET} = 0.013$

Max. Allowable Spread for Minor & Major Storm $T_{MAX} = 6.0$ (Minor Storm) / 12.0 (Major Storm) ft

Max. Allowable Depth at Gutter Flowline for Minor & Major Storm $Q_{MAX} = 6.0$ (Minor Storm) / 9.0 (Major Storm) inches

Allow Flow Depth at Street Crown (leave blank for no) check = yes

MINOR STORM Allowable Capacity is based on Spread Criterion

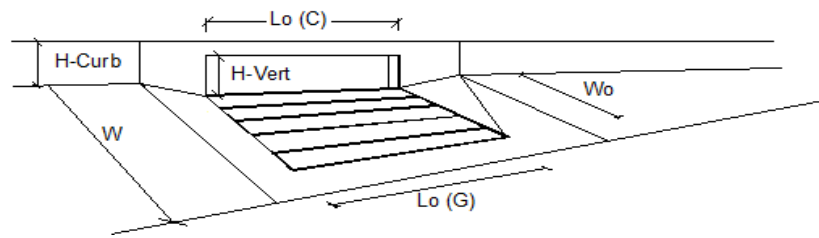
MAJOR STORM Allowable Capacity is based on Spread Criterion

$Q_{allow} = 1.6$ (Minor Storm) / 8.7 (Major Storm) cfs

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE



Design Information (Input) CDOT Type R Curb Opening

Type of Inlet

Local Depression (additional to continuous gutter depression 'a')

Total Number of Units in the Inlet (Grate or Curb Opening)

Length of a Single Unit Inlet (Grate or Curb Opening)

Width of a Unit Grate (cannot be greater than W, Gutter Width)

Clogging Factor for a Single Unit Grate (typical min. value = 0.5)

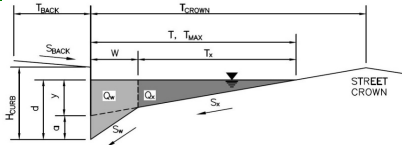
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)

Street Hydraulics: OK - Q < Allowable Street Capacity'

| | MINOR | MAJOR | |
|---------------|--------------------------|-------|--------|
| Type = | CDOT Type R Curb Opening | | |
| $a_{LOCAL} =$ | 3.0 | 3.0 | inches |
| No = | 1 | 1 | |
| $L_o =$ | 5.00 | 5.00 | ft |
| $W_o =$ | N/A | N/A | ft |
| $C_r-G =$ | N/A | N/A | |
| $C_r-C =$ | 0.10 | 0.10 | |
| $Q =$ | 1.2 | 2.3 | cfs |
| $Q_b =$ | 0.1 | 1.8 | cfs |
| C% = | 95 | 57 | % |

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)
 (Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Parker MOB III**
 Inlet ID: **Inlet A-22A**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb
 Side Slope Behind Curb (leave blank for no conveyance credit behind curb)
 Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

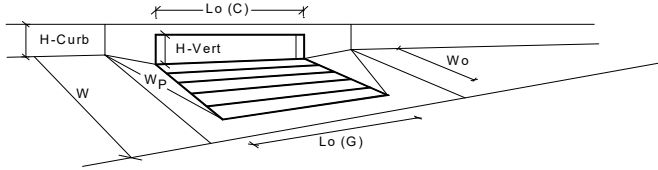
Height of Curb at Gutter Flow Line
 Distance from Curb Face to Street Crown
 Gutter Width
 Street Transverse Slope
 Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)
 Street Longitudinal Slope - Enter 0 for sump condition
 Manning's Roughness for Street Section (typically between 0.012 and 0.020)

Max. Allowable Spread for Minor & Major Storm
 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm
 Check boxes are not applicable in SUMP conditions

MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

| | | |
|--------------|--------------------------|--------|
| T_{BACK} | 10.0 | ft |
| S_{BACK} | 0.020 | ft/ft |
| n_{BACK} | 0.013 | |
| H_{CURB} | 9.00 | inches |
| T_{CROWN} | 12.0 | ft |
| W | 2.00 | ft |
| S_x | 0.040 | ft/ft |
| S_w | 0.083 | ft/ft |
| S_o | 0.000 | ft/ft |
| n_{STREET} | 0.013 | |
| T_{MAX} | 12.0 | ft |
| d_{MAX} | 6.0 | inches |
| | <input type="checkbox"/> | |
| | <input type="checkbox"/> | |
| Q_{allow} | SUMP | SUMP |
| | | cfs |

INLET IN A SUMP OR SAG LOCATION



Design Information (Input) CDOT Type R Curb Opening

Type of Inlet
 Local Depression (additional to continuous gutter depression 'a' from above)
 Number of Unit Inlets (Grate or Curb Opening)
 Water Depth at Flowline (outside of local depression)

Grate Information

Length of a Unit Grate
 Width of a Unit Grate
 Area Opening Ratio for a Grate (typical values 0.15-0.90)
 Clogging Factor for a Single Grate (typical value 0.50 - 0.70)
 Grate Weir Coefficient (typical value 2.15 - 3.60)
 Grate Orifice Coefficient (typical value 0.60 - 0.80)

Curb Opening Information

Length of a Unit Curb Opening
 Height of Vertical Curb Opening in Inches
 Height of Curb Orifice Throat in Inches
 Angle of Throat (see USDCM Figure ST-5)
 Side Width for Depression Pan (typically the gutter width of 2 feet)
 Clogging Factor for a Single Curb Opening (typical value 0.10)
 Curb Opening Weir Coefficient (typical value 2.3-3.7)
 Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)

Low Head Performance Reduction (Calculated)

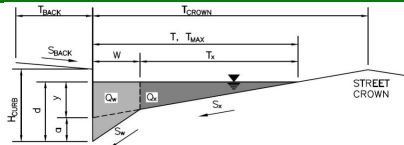
Depth for Grate Midwidth
 Depth for Curb Opening Weir Equation
 Combination Inlet Performance Reduction Factor for Long Inlets
 Curb Opening Performance Reduction Factor for Long Inlets
 Grated Inlet Performance Reduction Factor for Long Inlets

Total Inlet Interception Capacity (assumes clogged condition)
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)

| | MINOR | MAJOR | |
|---------------------|--------------------------|--------------------------|-----------------|
| Type | CDOT Type R Curb Opening | | |
| a_{local} | 0.00 | 0.00 | inches |
| N_o | 1 | 1 | |
| Ponding Depth | 6.0 | 6.8 | inches |
| | <input type="checkbox"/> | <input type="checkbox"/> | Override Depths |
| $L_o (G)$ | N/A | N/A | feet |
| W_o | N/A | N/A | feet |
| A_{ratio} | N/A | N/A | |
| $C_r (G)$ | N/A | N/A | |
| $C_w (G)$ | N/A | N/A | |
| $C_o (G)$ | N/A | N/A | |
| | MINOR | MAJOR | |
| $L_o (C)$ | 5.00 | 5.00 | feet |
| H_{vert} | 6.00 | 6.00 | inches |
| H_{throat} | 6.00 | 6.00 | inches |
| θ | 63.40 | 63.40 | degrees |
| W_p | 2.00 | 2.00 | feet |
| $C_r (C)$ | 0.10 | 0.10 | |
| $C_w (C)$ | 3.60 | 3.60 | |
| $C_o (C)$ | 0.67 | 0.67 | |
| | MINOR | MAJOR | |
| d_{Grate} | N/A | N/A | ft |
| d_{Curb} | 0.33 | 0.40 | ft |
| $RF_{Combination}$ | 0.77 | 0.87 | |
| RF_{Curb} | 1.00 | 1.00 | |
| RF_{Grate} | N/A | N/A | |
| | MINOR | MAJOR | |
| Q_a | 5.4 | 6.6 | cfs |
| $Q_{PEAK REQUIRED}$ | 1.5 | 2.9 | cfs |

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)
 (Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Parker MOB III
 Inlet ID: Inlet A-21B



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb
 Side Slope Behind Curb (leave blank for no conveyance credit behind curb)
 Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

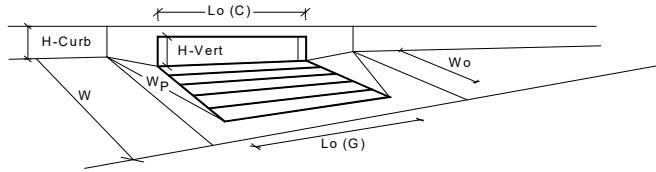
Height of Curb at Gutter Flow Line
 Distance from Curb Face to Street Crown
 Gutter Width
 Street Transverse Slope
 Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)
 Street Longitudinal Slope - Enter 0 for sump condition
 Manning's Roughness for Street Section (typically between 0.012 and 0.020)

Max. Allowable Spread for Minor & Major Storm
 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm
 Check boxes are not applicable in SUMP conditions

MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

| | | |
|--------------|--------------------------|--------|
| T_{BACK} | 10.0 | ft |
| S_{BACK} | 0.020 | ft/ft |
| n_{BACK} | 0.013 | |
| H_{CURB} | 6.00 | inches |
| T_{CROWN} | 12.0 | ft |
| W | 1.00 | ft |
| S_x | 0.018 | ft/ft |
| S_w | 0.083 | ft/ft |
| S_o | 0.000 | ft/ft |
| n_{STREET} | 0.013 | |
| T_{MAX} | 12.0 | ft |
| d_{MAX} | 6.0 | inches |
| | <input type="checkbox"/> | |
| Q_{allow} | SUMP | cfs |

INLET IN A SUMP OR SAG LOCATION



Design Information (Input) | CDOT Type R Curb Opening

Type of Inlet
 Local Depression (additional to continuous gutter depression 'a' from above)
 Number of Unit Inlets (Grate or Curb Opening)
 Water Depth at Flowline (outside of local depression)

Grate Information
 Length of a Unit Grate
 Width of a Unit Grate
 Area Opening Ratio for a Grate (typical values 0.15-0.90)
 Clogging Factor for a Single Grate (typical value 0.50 - 0.70)
 Grate Weir Coefficient (typical value 2.15 - 3.60)
 Grate Orifice Coefficient (typical value 0.60 - 0.80)

Curb Opening Information
 Length of a Unit Curb Opening
 Height of Vertical Curb Opening in Inches
 Height of Curb Orifice Throat in Inches
 Angle of Throat (see USDCM Figure ST-5)
 Side Width for Depression Pan (typically the gutter width of 2 feet)
 Clogging Factor for a Single Curb Opening (typical value 0.10)
 Curb Opening Weir Coefficient (typical value 2.3-3.7)
 Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)

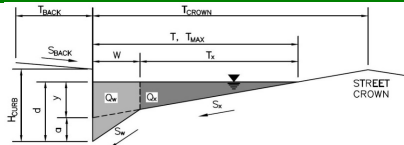
Low Head Performance Reduction (Calculated)
 Depth for Grate Midwidth
 Depth for Curb Opening Weir Equation
 Combination Inlet Performance Reduction Factor for Long Inlets
 Curb Opening Performance Reduction Factor for Long Inlets
 Grated Inlet Performance Reduction Factor for Long Inlets

Total Inlet Interception Capacity (assumes clogged condition)
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)

| | MINOR | MAJOR | |
|---------------------|--------------------------|-------------------------------------|-----------------|
| Type | CDOT Type R Curb Opening | | |
| a_{local} | 3.00 | 3.00 | inches |
| N_o | 1 | 1 | |
| Ponding Depth | 6.0 | 9.0 | inches |
| | <input type="checkbox"/> | <input checked="" type="checkbox"/> | Override Depths |
| $L_o (G)$ | N/A | N/A | feet |
| W_o | N/A | N/A | feet |
| A_{ratio} | N/A | N/A | |
| $C_r (G)$ | N/A | N/A | |
| $C_w (G)$ | N/A | N/A | |
| $C_o (G)$ | N/A | N/A | |
| $L_o (C)$ | 5.00 | 5.00 | feet |
| H_{vert} | 6.00 | 6.00 | inches |
| H_{throat} | 6.00 | 6.00 | inches |
| θ | 63.40 | 63.40 | degrees |
| W_p | 1.00 | 1.00 | feet |
| $C_r (C)$ | 0.10 | 0.10 | |
| $C_w (C)$ | 3.60 | 3.60 | |
| $C_o (C)$ | 0.67 | 0.67 | |
| d_{Grate} | N/A | N/A | ft |
| d_{Curb} | 0.42 | 0.67 | ft |
| $RF_{Combination}$ | 0.77 | 1.00 | |
| RF_{Curb} | 1.00 | 1.00 | |
| RF_{Grate} | N/A | N/A | |
| Q_a | 5.9 | 10.5 | cfs |
| $Q_{PEAK REQUIRED}$ | 1.9 | 3.7 | cfs |

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)
 (Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Parker MOB III**
 Inlet ID: **Inlet A-31**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb
 Side Slope Behind Curb (leave blank for no conveyance credit behind curb)
 Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

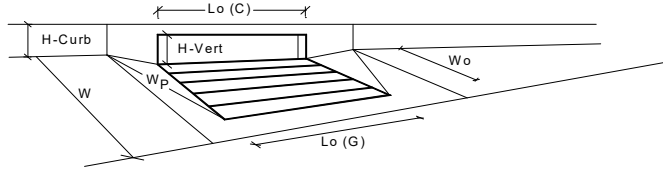
Height of Curb at Gutter Flow Line
 Distance from Curb Face to Street Crown
 Gutter Width
 Street Transverse Slope
 Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)
 Street Longitudinal Slope - Enter 0 for sump condition
 Manning's Roughness for Street Section (typically between 0.012 and 0.020)

Max. Allowable Spread for Minor & Major Storm
 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm
 Check boxes are not applicable in SUMP conditions

MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

| | | | |
|--------------|---|--------------------------|--------|
| T_{BACK} | = | 15.0 | ft |
| S_{BACK} | = | 0.020 | ft/ft |
| n_{BACK} | = | 0.013 | |
| H_{CURB} | = | 6.00 | inches |
| T_{CROWN} | = | 24.0 | ft |
| W | = | 1.00 | ft |
| S_x | = | 0.040 | ft/ft |
| S_w | = | 0.083 | ft/ft |
| S_o | = | 0.000 | ft/ft |
| n_{STREET} | = | 0.013 | |
| T_{MAX} | = | 12.0 | ft |
| d_{MAX} | = | 6.0 | inches |
| | | <input type="checkbox"/> | |
| | | <input type="checkbox"/> | |
| Q_{allow} | = | SUMP | SUMP |
| | | | cfs |

INLET IN A SUMP OR SAG LOCATION



Design Information (Input) CDOT Type R Curb Opening

Type of Inlet
 Local Depression (additional to continuous gutter depression 'a' from above)
 Number of Unit Inlets (Grate or Curb Opening)
 Water Depth at Flowline (outside of local depression)

Grate Information

Length of a Unit Grate
 Width of a Unit Grate
 Area Opening Ratio for a Grate (typical values 0.15-0.90)
 Clogging Factor for a Single Grate (typical value 0.50 - 0.70)
 Grate Weir Coefficient (typical value 2.15 - 3.60)
 Grate Orifice Coefficient (typical value 0.60 - 0.80)

Curb Opening Information

Length of a Unit Curb Opening
 Height of Vertical Curb Opening in Inches
 Height of Curb Orifice Throat in Inches
 Angle of Throat (see USDCM Figure ST-5)
 Side Width for Depression Pan (typically the gutter width of 2 feet)
 Clogging Factor for a Single Curb Opening (typical value 0.10)
 Curb Opening Weir Coefficient (typical value 2.3-3.7)
 Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)

Low Head Performance Reduction (Calculated)

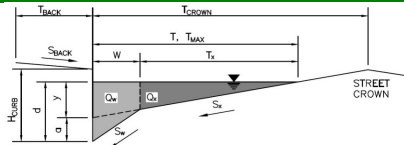
Depth for Grate Midwidth
 Depth for Curb Opening Weir Equation
 Combination Inlet Performance Reduction Factor for Long Inlets
 Curb Opening Performance Reduction Factor for Long Inlets
 Grated Inlet Performance Reduction Factor for Long Inlets

Total Inlet Interception Capacity (assumes clogged condition)
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)

| | MINOR | MAJOR | |
|---------------------|--------------------------|--------------------------|-----------------|
| Type | CDOT Type R Curb Opening | | |
| a_{local} | 3.00 | 3.00 | inches |
| N_o | 1 | 1 | |
| Ponding Depth | 6.0 | 9.0 | inches |
| | <input type="checkbox"/> | <input type="checkbox"/> | Override Depths |
| $L_o (G)$ | N/A | N/A | feet |
| W_o | N/A | N/A | feet |
| A_{ratio} | N/A | N/A | |
| $C_r (G)$ | N/A | N/A | |
| $C_w (G)$ | N/A | N/A | |
| $C_o (G)$ | N/A | N/A | |
| | MINOR | MAJOR | |
| $L_o (C)$ | 5.00 | 5.00 | feet |
| H_{vert} | 6.00 | 6.00 | inches |
| H_{throat} | 6.00 | 6.00 | inches |
| θ | 63.40 | 63.40 | degrees |
| W_p | 1.00 | 1.00 | feet |
| $C_r (C)$ | 0.10 | 0.10 | |
| $C_w (C)$ | 3.60 | 3.60 | |
| $C_o (C)$ | 0.67 | 0.67 | |
| | MINOR | MAJOR | |
| d_{Grate} | N/A | N/A | ft |
| d_{Curb} | 0.42 | 0.67 | ft |
| $RF_{Combination}$ | 0.77 | 1.00 | |
| RF_{Curb} | 1.00 | 1.00 | |
| RF_{Grate} | N/A | N/A | |
| | MINOR | MAJOR | |
| Q_a | 5.9 | 10.5 | cfs |
| $Q_{PEAK REQUIRED}$ | 2.5 | 4.8 | cfs |

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)
 (Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Parker MOB III**
 Inlet ID: **Inlet A-42**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb: $T_{BACK} = 20.0$ ft

Side Slope Behind Curb (leave blank for no conveyance credit behind curb): $S_{BACK} = 0.020$ ft/ft

Manning's Roughness Behind Curb (typically between 0.012 and 0.020): $n_{BACK} = 0.013$

Height of Curb at Gutter Flow Line: $H_{CURB} = 6.00$ inches

Distance from Curb Face to Street Crown: $T_{CROWN} = 24.0$ ft

Gutter Width: $W = 1.00$ ft

Street Transverse Slope: $S_x = 0.030$ ft/ft

Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft): $S_w = 0.083$ ft/ft

Street Longitudinal Slope - Enter 0 for sump condition: $S_o = 0.000$ ft/ft

Manning's Roughness for Street Section (typically between 0.012 and 0.020): $n_{STREET} = 0.013$

Max. Allowable Spread for Minor & Major Storm: $T_{MAX} = 24.0$ ft (Minor Storm), 24.0 ft (Major Storm)

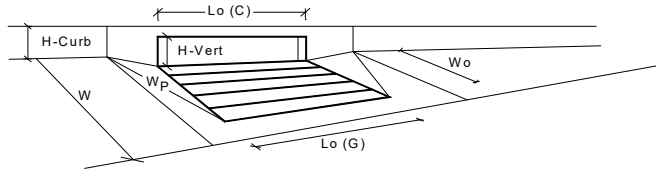
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm: $d_{MAX} = 6.0$ inches (Minor Storm), 9.0 inches (Major Storm)

Check boxes are not applicable in SUMP conditions:

MINOR STORM Allowable Capacity is based on Depth Criterion
 MAJOR STORM Allowable Capacity is based on Depth Criterion

$Q_{allow} =$ **SUMP** (Minor Storm), **SUMP** (Major Storm) cfs

INLET IN A SUMP OR SAG LOCATION



Design Information (Input) | **CDOT Type R Curb Opening**

Type of Inlet: **CDOT Type R Curb Opening**

Local Depression (additional to continuous gutter depression 'a' from above): $a_{local} = 3.00$ inches

Number of Unit Inlets (Grate or Curb Opening): $N_o = 1$

Water Depth at Flowline (outside of local depression): **Ponding Depth** = 6.0 inches (Minor), 9.0 inches (Major)

Grate Information

Length of a Unit Grate: $L_o (G) = N/A$ feet

Width of a Unit Grate: $W_o = N/A$ feet

Area Opening Ratio for a Grate (typical values 0.15-0.90): $A_{ratio} = N/A$

Clogging Factor for a Single Grate (typical value 0.50 - 0.70): $C_r (G) = N/A$

Grate Weir Coefficient (typical value 2.15 - 3.60): $C_w (G) = N/A$

Grate Orifice Coefficient (typical value 0.60 - 0.80): $C_o (G) = N/A$

Curb Opening Information

Length of a Unit Curb Opening: $L_o (C) = 5.00$ feet

Height of Vertical Curb Opening in Inches: $H_{vert} = 6.00$ inches

Height of Curb Orifice Throat in Inches: $H_{throat} = 6.00$ inches

Angle of Throat (see USDCM Figure ST-5): $\theta = 63.40$ degrees

Side Width for Depression Pan (typically the gutter width of 2 feet): $W_o = 1.00$ feet

Clogging Factor for a Single Curb Opening (typical value 0.10): $C_r (C) = 0.10$

Curb Opening Weir Coefficient (typical value 2.3-3.7): $C_w (C) = 3.60$

Curb Opening Orifice Coefficient (typical value 0.60 - 0.70): $C_o (C) = 0.67$

Low Head Performance Reduction (Calculated)

Depth for Grate Midwidth: $d_{Grate} = N/A$ ft

Depth for Curb Opening Weir Equation: $d_{Curb} = 0.42$ ft

Combination Inlet Performance Reduction Factor for Long Inlets: $RF_{Combination} = 0.77$

Curb Opening Performance Reduction Factor for Long Inlets: $RF_{Curb} = 1.00$

Grated Inlet Performance Reduction Factor for Long Inlets: $RF_{Grate} = N/A$

Total Inlet Interception Capacity (assumes clogged condition)

Inlet Capacity IS GOOD for Minor and Major Storms (>Q PEAK)

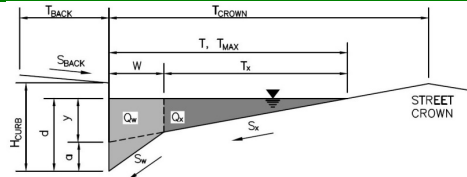
$Q_a = 5.9$ cfs (Minor), 10.5 cfs (Major)

$Q_{PEAK REQUIRED} = 2.2$ cfs (Minor), 4.5 cfs (Major)

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Parker MOB III
 Inlet ID: Inlet A-41



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb $T_{BACK} = 5.0$ ft
 Side Slope Behind Curb (leave blank for no conveyance credit behind curb) $S_{BACK} = 0.020$ ft/ft
 Manning's Roughness Behind Curb (typically between 0.012 and 0.020) $n_{BACK} = 0.013$

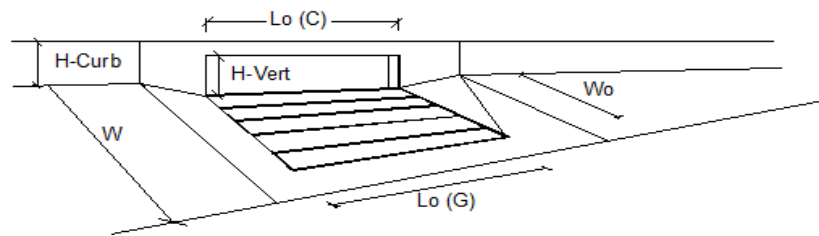
Height of Curb at Gutter Flow Line $H_{CURB} = 6.00$ inches
 Distance from Curb Face to Street Crown $T_{CROWN} = 12.0$ ft
 Gutter Width $W = 1.00$ ft
 Street Transverse Slope $S_x = 0.030$ ft/ft
 Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft) $S_w = 0.083$ ft/ft
 Street Longitudinal Slope - Enter 0 for sump condition $S_o = 0.027$ ft/ft
 Manning's Roughness for Street Section (typically between 0.012 and 0.020) $n_{STREET} = 0.013$

Max. Allowable Spread for Minor & Major Storm $T_{MAX} = 12.0$ ft (Minor Storm) / 12.0 ft (Major Storm)
 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm $Q_{MAX} = 5.0$ inches (Minor Storm) / 6.0 inches (Major Storm)
 Allow Flow Depth at Street Crown (leave blank for no) check = yes

MINOR STORM Allowable Capacity is based on Spread Criterion
MAJOR STORM Allowable Capacity is based on Spread Criterion
 Minor storm max. allowable capacity **GOOD** - greater than the design flow given on sheet 'Inlet Management'
 Major storm max. allowable capacity **GOOD** - greater than the design flow given on sheet 'Inlet Management'

$Q_{allow} = 15.9$ cfs (Minor Storm) / 15.9 cfs (Major Storm)

INLET ON A CONTINUOUS GRADE



Design Information (Input) CDOT Type R Curb Opening

Type of Inlet: CDOT Type R Curb Opening

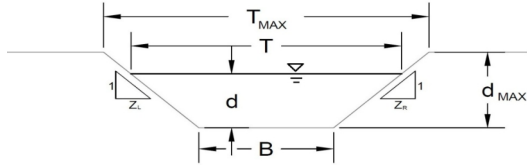
| | MINOR | MAJOR | |
|---------------|--------------------------|-------|--------|
| Type = | CDOT Type R Curb Opening | | |
| $a_{LOCAL} =$ | 3.0 | 3.0 | inches |
| No = | 1 | 1 | |
| $L_o =$ | 5.00 | 5.00 | ft |
| $W_o =$ | N/A | N/A | ft |
| $C_r-G =$ | N/A | N/A | |
| $C_r-C =$ | 0.10 | 0.10 | |

Street Hydraulics: OK - Q < Allowable Street Capacity'

| | MINOR | MAJOR | |
|--|-------|-------|-----|
| Total Inlet Interception Capacity $Q =$ | 1.8 | 2.8 | cfs |
| Total Inlet Carry-Over Flow (flow bypassing inlet) $Q_b =$ | 0.5 | 2.5 | cfs |
| Capture Percentage = $Q_c/Q_o =$ | 78 | 53 | % |

AREA INLET IN A SWALE

Parker MOB III
Inlet A-10



This worksheet uses the NRCS vegetative retardance method to determine Manning's n.
For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)
Manning's n (Leave cell D16 blank to manually enter an n value)
Channel Invert Slope
Bottom Width
Left Side Slope
Right Side Slope

A, B, C, D or E: **C**
n = see details below
S₀ = 0.0200 ft/ft
B = 5.00 ft
Z1 = 4.00 ft/ft
Z2 = 4.00 ft/ft

Check one of the following soil types:

| Soil Type: | Max. Velocity (V _{MAX}) | Max Froude No. (F _{MAX}) |
|--------------|-----------------------------------|------------------------------------|
| Non-Cohesive | 5.0 fps | 0.60 |
| Cohesive | 7.0 fps | 0.80 |
| Paved | N/A | N/A |

Choose One:

Non-Cohesive
 Cohesive
 Paved

Max. Allowable Top Width of Channel for Minor & Major Storm
Max. Allowable Water Depth in Channel for Minor & Major Storm

| | Minor Storm | Major Storm | |
|------------------|-------------|-------------|------|
| T _{MAX} | 10.00 | 15.00 | feet |
| d _{MAX} | 0.50 | 1.00 | feet |

Allowable Channel Capacity Based On Channel Geometry

MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

| | Minor Storm | Major Storm | |
|--------------------|-------------|-------------|-----|
| Q _{allow} | 0.9 | 25.5 | cfs |
| d _{allow} | 0.50 | 1.00 | ft |

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow
Water Depth

| | | | |
|----------------|------|------|------|
| Q _o | 0.3 | 5.3 | cfs |
| d | 0.27 | 0.70 | feet |

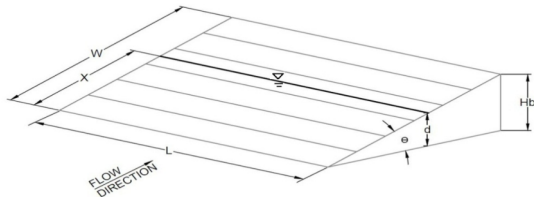
Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Inlet Design Information (Input)

Type of Inlet: **CDOT Type C**

Inlet Type = **CDOT Type C**

Angle of Inclined Grate (must be <= 30 degrees)
Width of Grate
Length of Grate
Open Area Ratio
Height of Inclined Grate
Clogging Factor
Grate Discharge Coefficient
Orifice Coefficient
Weir Coefficient



θ = 0.00 degrees
W = 3.00 feet
L = 3.00 feet
A_{RATIO} = 0.70
H_B = 0.00 feet
C_f = 0.50
C_d = 0.96
C_o = 0.64
C_w = 2.05

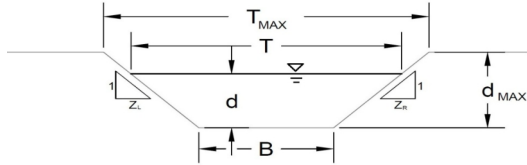
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)

Total Inlet Interception Capacity (assumes clogged condition)

| | MINOR | MAJOR | |
|--|-------|-------|-----|
| d | 0.27 | 0.70 | |
| Q _a | 2.6 | 10.7 | cfs |
| Bypassed Flow, Q _b | 0.0 | 0.0 | cfs |
| Capture Percentage = Q _a /Q _o = C% | 100 | 100 | % |

AREA INLET IN A SWALE

Parker MOB III
Inlet B-10



This worksheet uses the NRCS vegetative retardance method to determine Manning's n.
For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E) A, B, C, D or E **C**
Manning's n (Leave cell D16 blank to manually enter an n value) n = see details below
Channel Invert Slope S₀ = 0.0060 ft/ft
Bottom Width B = 3.00 ft
Left Side Slope Z1 = 4.00 ft/ft
Right Side Slope Z2 = 4.00 ft/ft

Check one of the following soil types:

| Soil Type: | Max. Velocity (V _{MAX}) | Max Froude No. (F _{MAX}) |
|--------------|-----------------------------------|------------------------------------|
| Non-Cohesive | 5.0 fps | 0.60 |
| Cohesive | 7.0 fps | 0.80 |
| Paved | N/A | N/A |

Choose One:
 Non-Cohesive
 Cohesive
 Paved

| | Minor Storm | Major Storm | |
|---|-------------|-------------|------|
| Max. Allowable Top Width of Channel for Minor & Major Storm | 5.00 | 15.00 | feet |
| Max. Allowable Water Depth in Channel for Minor & Major Storm | 1.00 | 2.00 | feet |

Allowable Channel Capacity Based On Channel Geometry

MINOR STORM Allowable Capacity is based on Top Width Criterion Minor Storm **0.1** Major Storm **19.2** cfs
MAJOR STORM Allowable Capacity is based on Top Width Criterion d_{allow} = **0.25** **1.50** ft

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow Q_o = **0.1** **1.1** cfs
Water Depth d = **0.20** **0.89** feet

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Inlet Design Information (Input)

Type of Inlet CDOT Type C (Depressed) Inlet Type = **CDOT Type C (Depressed)**

Angle of Inclined Grate (must be <= 30 degrees) θ = **0.00** degrees
Width of Grate W = **3.00** feet
Length of Grate L = **3.00** feet
Open Area Ratio A_{RATIO} = **0.70**
Height of Inclined Grate H_B = **0.00** feet
Clogging Factor C_f = **0.50**
Grate Discharge Coefficient C_g = **0.84**
Orifice Coefficient C_o = **0.56**
Weir Coefficient C_w = **1.81**

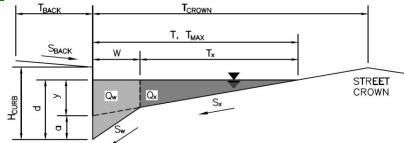
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression) d = **1.20** **1.89**

Total Inlet Interception Capacity (assumes clogged condition)

| | MINOR | MAJOR | |
|--|-------------|-------------|-----|
| Total Inlet Interception Capacity | 15.6 | 19.5 | cfs |
| Bypassed Flow, Q _b | 0.0 | 0.0 | cfs |
| Capture Percentage = Q _a /Q _o = C% | 100 | 100 | % |

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)
 (Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Parker MOB III**
 Inlet ID: **Inlet B-20**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb
 Side Slope Behind Curb (leave blank for no conveyance credit behind curb)
 Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

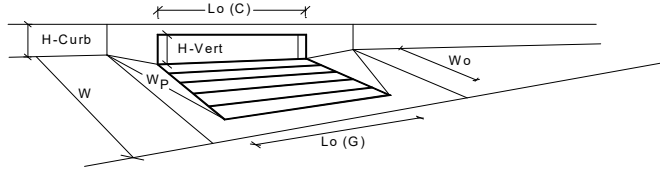
Height of Curb at Gutter Flow Line
 Distance from Curb Face to Street Crown
 Gutter Width
 Street Transverse Slope
 Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)
 Street Longitudinal Slope - Enter 0 for sump condition
 Manning's Roughness for Street Section (typically between 0.012 and 0.020)

Max. Allowable Spread for Minor & Major Storm
 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm
 Check boxes are not applicable in SUMP conditions

MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

| | | |
|--------------|--------------------------------------|--------|
| T_{BACK} | 10.0 | ft |
| S_{BACK} | 0.010 | ft/ft |
| n_{BACK} | 0.013 | |
| H_{CURB} | 6.00 | inches |
| T_{CROWN} | 18.0 | ft |
| W | 1.00 | ft |
| S_x | 0.033 | ft/ft |
| S_w | 0.083 | ft/ft |
| S_o | 0.000 | ft/ft |
| n_{STREET} | 0.013 | |
| T_{MAX} | Minor Storm: 12.0, Major Storm: 18.0 | ft |
| d_{MAX} | Minor Storm: 6.0, Major Storm: 9.0 | inches |
| Q_{allow} | Minor Storm: SUMP, Major Storm: SUMP | cfs |

INLET IN A SUMP OR SAG LOCATION



Design Information (Input) | **CDOT Type R Curb Opening**

Type of Inlet
 Local Depression (additional to continuous gutter depression 'a' from above)
 Number of Unit Inlets (Grate or Curb Opening)
 Water Depth at Flowline (outside of local depression)

Grate Information
 Length of a Unit Grate
 Width of a Unit Grate
 Area Opening Ratio for a Grate (typical values 0.15-0.90)
 Clogging Factor for a Single Grate (typical value 0.50 - 0.70)
 Grate Weir Coefficient (typical value 2.15 - 3.60)
 Grate Orifice Coefficient (typical value 0.60 - 0.80)

Curb Opening Information
 Length of a Unit Curb Opening
 Height of Vertical Curb Opening in Inches
 Height of Curb Orifice Throat in Inches
 Angle of Throat (see USDCM Figure ST-5)
 Side Width for Depression Pan (typically the gutter width of 2 feet)
 Clogging Factor for a Single Curb Opening (typical value 0.10)
 Curb Opening Weir Coefficient (typical value 2.3-3.7)
 Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)

Low Head Performance Reduction (Calculated)
 Depth for Grate Midwidth
 Depth for Curb Opening Weir Equation
 Combination Inlet Performance Reduction Factor for Long Inlets
 Curb Opening Performance Reduction Factor for Long Inlets
 Grated Inlet Performance Reduction Factor for Long Inlets

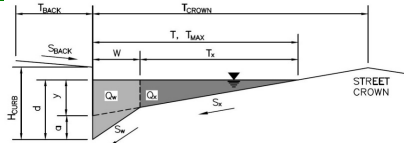
Total Inlet Interception Capacity (assumes clogged condition)
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)

| | MINOR | MAJOR | |
|---------------------|--------------------------|-------|---------|
| Type | CDOT Type R Curb Opening | | |
| a_{local} | 3.00 | 3.00 | inches |
| No | 1 | 1 | |
| Ponding Depth | 5.4 | 7.7 | inches |
| $L_o (G)$ | N/A | N/A | feet |
| W_o | N/A | N/A | feet |
| A_{ratio} | N/A | N/A | |
| $C_r (G)$ | N/A | N/A | |
| $C_w (G)$ | N/A | N/A | |
| $C_o (G)$ | N/A | N/A | |
| $L_o (C)$ | 5.00 | 5.00 | feet |
| H_{vert} | 6.00 | 6.00 | inches |
| H_{throat} | 6.00 | 6.00 | inches |
| Theta | 63.40 | 63.40 | degrees |
| W_p | 1.00 | 1.00 | feet |
| $C_r (C)$ | 0.10 | 0.10 | |
| $C_w (C)$ | 3.60 | 3.60 | |
| $C_o (C)$ | 0.67 | 0.67 | |
| d_{Grate} | N/A | N/A | ft |
| d_{Curb} | 0.36 | 0.56 | ft |
| $RF_{Combination}$ | 0.69 | 0.99 | |
| RF_{Curb} | 1.00 | 1.00 | |
| RF_{Grate} | N/A | N/A | |
| Q_a | 4.8 | 8.9 | cfs |
| $Q_{PEAK REQUIRED}$ | 1.4 | 3.6 | cfs |

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Parker MOB III
 Inlet ID: Inlet B-60



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb: $T_{BACK} = 15.0$ ft

Side Slope Behind Curb (leave blank for no conveyance credit behind curb): $S_{BACK} = 0.020$ ft/ft

Manning's Roughness Behind Curb (typically between 0.012 and 0.020): $n_{BACK} = 0.013$

Height of Curb at Gutter Flow Line: $H_{CURB} = 6.00$ inches

Distance from Curb Face to Street Crown: $T_{CROWN} = 50.0$ ft

Gutter Width: $W = 1.00$ ft

Street Transverse Slope: $S_x = 0.034$ ft/ft

Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft): $S_w = 0.083$ ft/ft

Street Longitudinal Slope - Enter 0 for sump condition: $S_o = 0.000$ ft/ft

Manning's Roughness for Street Section (typically between 0.012 and 0.020): $n_{STREET} = 0.013$

Max. Allowable Spread for Minor & Major Storm: $T_{MAX} = 12.0$ (Minor Storm) / 24.0 (Major Storm) ft

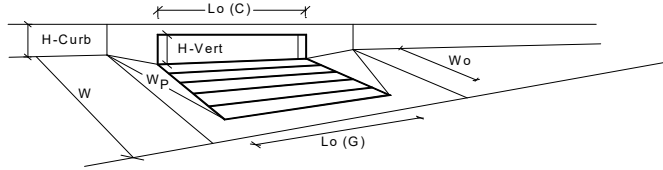
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm: $d_{MAX} = 6.0$ (Minor Storm) / 9.0 (Major Storm) inches

Check boxes are not applicable in SUMP conditions:

MINOR STORM Allowable Capacity is based on Depth Criterion
 MAJOR STORM Allowable Capacity is based on Depth Criterion

$Q_{allow} =$ $SUMP$ (Minor Storm) / $SUMP$ (Major Storm) cfs

INLET IN A SUMP OR SAG LOCATION



Design Information (Input) | CDOT Type R Curb Opening

Type of Inlet: CDOT Type R Curb Opening

Local Depression (additional to continuous gutter depression 'a' from above): $a_{local} = 3.00$ inches

Number of Unit Inlets (Grate or Curb Opening): $N_o = 1$

Water Depth at Flowline (outside of local depression): $Ponding\ Depth = 5.5$ (Minor) / 9.0 (Major) inches

Override Depths

Grate Information

Length of a Unit Grate: $L_o (G) = N/A$ feet

Width of a Unit Grate: $W_o = N/A$ feet

Area Opening Ratio for a Grate (typical values 0.15-0.90): $A_{ratio} = N/A$

Clogging Factor for a Single Grate (typical value 0.50 - 0.70): $C_r (G) = N/A$

Grate Weir Coefficient (typical value 2.15 - 3.60): $C_w (G) = N/A$

Grate Orifice Coefficient (typical value 0.60 - 0.80): $C_o (G) = N/A$

Curb Opening Information

Length of a Unit Curb Opening: $L_o (C) = 5.00$ feet

Height of Vertical Curb Opening in Inches: $H_{vert} = 6.00$ inches

Height of Curb Orifice Throat in Inches: $H_{throat} = 6.00$ inches

Angle of Throat (see USDCM Figure ST-5): $\theta = 63.40$ degrees

Side Width for Depression Pan (typically the gutter width of 2 feet): $W_o = 1.00$ feet

Clogging Factor for a Single Curb Opening (typical value 0.10): $C_r (C) = 0.10$

Curb Opening Weir Coefficient (typical value 2.3-3.7): $C_w (C) = 3.60$

Curb Opening Orifice Coefficient (typical value 0.60 - 0.70): $C_o (C) = 0.67$

Low Head Performance Reduction (Calculated)

Depth for Grate Midwidth: $d_{Grate} = N/A$ ft

Depth for Curb Opening Weir Equation: $d_{Curb} = 0.37$ ft

Combination Inlet Performance Reduction Factor for Long Inlets: $RF_{Combination} = 0.70$

Curb Opening Performance Reduction Factor for Long Inlets: $RF_{Curb} = 1.00$

Grated Inlet Performance Reduction Factor for Long Inlets: $RF_{Grate} = N/A$

Total Inlet Interception Capacity (assumes clogged condition)

$Q_a = 5.0$ (Minor) / 10.5 (Major) cfs

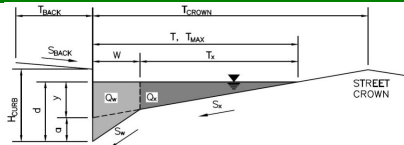
Inlet Capacity IS GOOD for Minor and Major Storms (>Q PEAK)

$Q_{PEAK\ REQUIRED} = 0.9$ (Minor) / 2.0 (Major) cfs

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Parker MOB III
 Inlet ID: Inlet B-70



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb
 Side Slope Behind Curb (leave blank for no conveyance credit behind curb)
 Manning's Roughness Behind Curb (typically between 0.012 and 0.020)
 Height of Curb at Gutter Flow Line
 Distance from Curb Face to Street Crown
 Gutter Width
 Street Transverse Slope
 Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)
 Street Longitudinal Slope - Enter 0 for sump condition
 Manning's Roughness for Street Section (typically between 0.012 and 0.020)

| | | | |
|---------------------|---|-------|--------|
| T _{BACK} | = | 15.0 | ft |
| S _{BACK} | = | 0.020 | ft/ft |
| n _{BACK} | = | 0.013 | |
| H _{CURB} | = | 6.00 | inches |
| T _{CROWN} | = | 50.0 | ft |
| W | = | 1.00 | ft |
| S _s | = | 0.045 | ft/ft |
| S _w | = | 0.083 | ft/ft |
| S _o | = | 0.000 | ft/ft |
| n _{STREET} | = | 0.013 | |

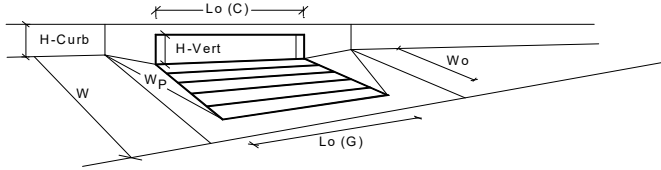
Max. Allowable Spread for Minor & Major Storm
 Max. Allowable Depth at Gutter Flowline for Minor & Major Storm
 Check boxes are not applicable in SUMP conditions

| | | | | |
|------------------|---|--------------------------|--------------------------|--------|
| T _{MAX} | = | 12.0 | 24.0 | ft |
| d _{MAX} | = | 6.0 | 9.0 | inches |
| | | <input type="checkbox"/> | <input type="checkbox"/> | |

MINOR STORM Allowable Capacity is based on Depth Criterion
 MAJOR STORM Allowable Capacity is based on Depth Criterion

| | | | | |
|--------------------|---|------|------|-----|
| Q _{allow} | = | SUMP | SUMP | cfs |
|--------------------|---|------|------|-----|

INLET IN A SUMP OR SAG LOCATION



Design Information (Input)

Type of Inlet: CDOT Type R Curb Opening
 Local Depression (additional to continuous gutter depression 'a' from above)
 Number of Unit Inlets (Grate or Curb Opening)
 Water Depth at Flowline (outside of local depression)
Grate Information
 Length of a Unit Grate
 Width of a Unit Grate
 Area Opening Ratio for a Grate (typical values 0.15-0.90)
 Clogging Factor for a Single Grate (typical value 0.50 - 0.70)
 Grate Weir Coefficient (typical value 2.15 - 3.60)
 Grate Orifice Coefficient (typical value 0.60 - 0.80)
Curb Opening Information
 Length of a Unit Curb Opening
 Height of Vertical Curb Opening in Inches
 Height of Curb Orifice Throat in Inches
 Angle of Throat (see USDCM Figure ST-5)
 Side Width for Depression Pan (typically the gutter width of 2 feet)
 Clogging Factor for a Single Curb Opening (typical value 0.10)
 Curb Opening Weir Coefficient (typical value 2.3-3.7)
 Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)

| | MINOR | MAJOR | |
|---------------------|--------------------------|--------------------------|-----------------|
| Type | CDOT Type R Curb Opening | | |
| a _{local} | 3.00 | 3.00 | inches |
| No | 1 | 1 | |
| Ponding Depth | 6.0 | 9.0 | inches |
| | <input type="checkbox"/> | <input type="checkbox"/> | Override Depths |
| L _o (G) | N/A | N/A | feet |
| W _o | N/A | N/A | feet |
| A _{ratio} | N/A | N/A | |
| C _r (G) | N/A | N/A | |
| C _w (G) | N/A | N/A | |
| C _o (G) | N/A | N/A | |
| L _o (C) | 5.00 | 5.00 | feet |
| H _{vert} | 6.00 | 6.00 | inches |
| H _{throat} | 6.00 | 6.00 | inches |
| Theta | 63.40 | 63.40 | degrees |
| W _p | 1.00 | 1.00 | feet |
| C _r (C) | 0.10 | 0.10 | |
| C _w (C) | 3.60 | 3.60 | |
| C _o (C) | 0.67 | 0.67 | |

Low Head Performance Reduction (Calculated)

Depth for Grate Midwidth
 Depth for Curb Opening Weir Equation
 Combination Inlet Performance Reduction Factor for Long Inlets
 Curb Opening Performance Reduction Factor for Long Inlets
 Grated Inlet Performance Reduction Factor for Long Inlets

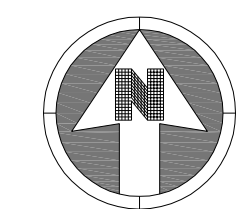
| | MINOR | MAJOR | |
|---------------------------|-------|-------|----|
| d _{Grate} | N/A | N/A | ft |
| d _{Curb} | 0.42 | 0.67 | ft |
| RF _{Combination} | 0.77 | 1.00 | |
| RF _{Curb} | 1.00 | 1.00 | |
| RF _{Grate} | N/A | N/A | |

Total Inlet Interception Capacity (assumes clogged condition)

Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)

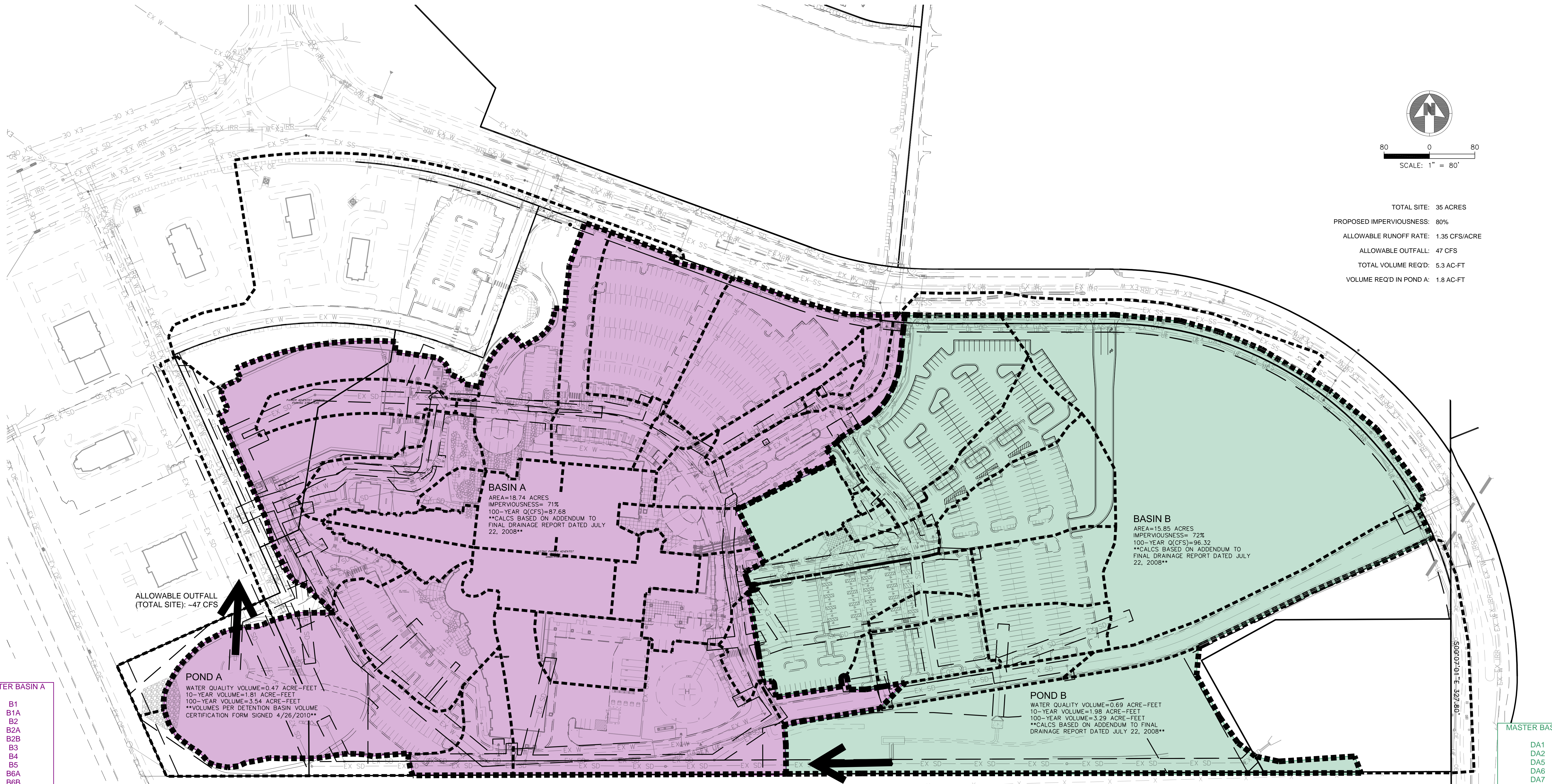
| | MINOR | MAJOR | |
|----------------------------|-------|-------|-----|
| Q _a | 5.9 | 10.5 | cfs |
| Q _{PEAK REQUIRED} | 0.6 | 1.4 | cfs |

MAPS



80 0 80
SCALE: 1" = 80'

TOTAL SITE: 35 ACRES
PROPOSED IMPERVIOUSNESS: 80%
ALLOWABLE RUNOFF RATE: 1.35 CFS/ACRE
ALLOWABLE OUTFALL: 47 CFS
TOTAL VOLUME REQ'D: 5.3 AC-FT
VOLUME REQ'D IN POND A: 1.8 AC-FT



BASIN A
AREA=18.74 ACRES
IMPERVIOUSNESS= 71%
100-YEAR Q(CFS)=87.68
CALCS BASED ON ADDENDUM TO FINAL DRAINAGE REPORT DATED JULY 22, 2008

BASIN B
AREA=15.85 ACRES
IMPERVIOUSNESS= 72%
100-YEAR Q(CFS)=96.32
CALCS BASED ON ADDENDUM TO FINAL DRAINAGE REPORT DATED JULY 22, 2008

ALLOWABLE OUTFALL
(TOTAL SITE): ~47 CFS

POND A
WATER QUALITY VOLUME=0.47 ACRE- FEET
10-YEAR VOLUME=1.81 ACRE- FEET
100-YEAR VOLUME=3.54 ACRE- FEET
VOLUMES PER DETENTION BASIN VOLUME CERTIFICATION FORM SIGNED 4/26/2010

POND B
WATER QUALITY VOLUME=0.69 ACRE- FEET
10-YEAR VOLUME=1.98 ACRE- FEET
100-YEAR VOLUME=3.29 ACRE- FEET
CALCS BASED ON ADDENDUM TO FINAL DRAINAGE REPORT DATED JULY 22, 2008

POND B OUTFALL

MASTER BASIN A

- B1
- B1A
- B2
- B2A
- B2B
- B3
- B4
- B5
- B6A
- B6B
- B6C
- B6D
- B8
- C1A
- C1B
- C1D
- C2
- C3
- C5
- C7
- C8
- C9
- D1
- D2
- D3
- D4
- D5
- D6
- D7

MASTER BASIN B

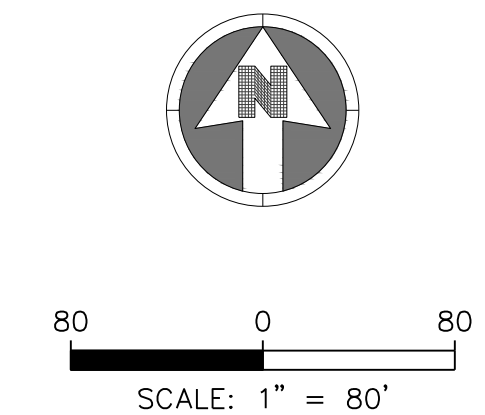
- DA1
- DA2
- DA5
- DA6
- DA7
- DA8
- DA9
- DA10
- DA11
- DA12
- DA13
- DA15
- DA16
- F1
- F3
- F4
- F5
- F6
- R1



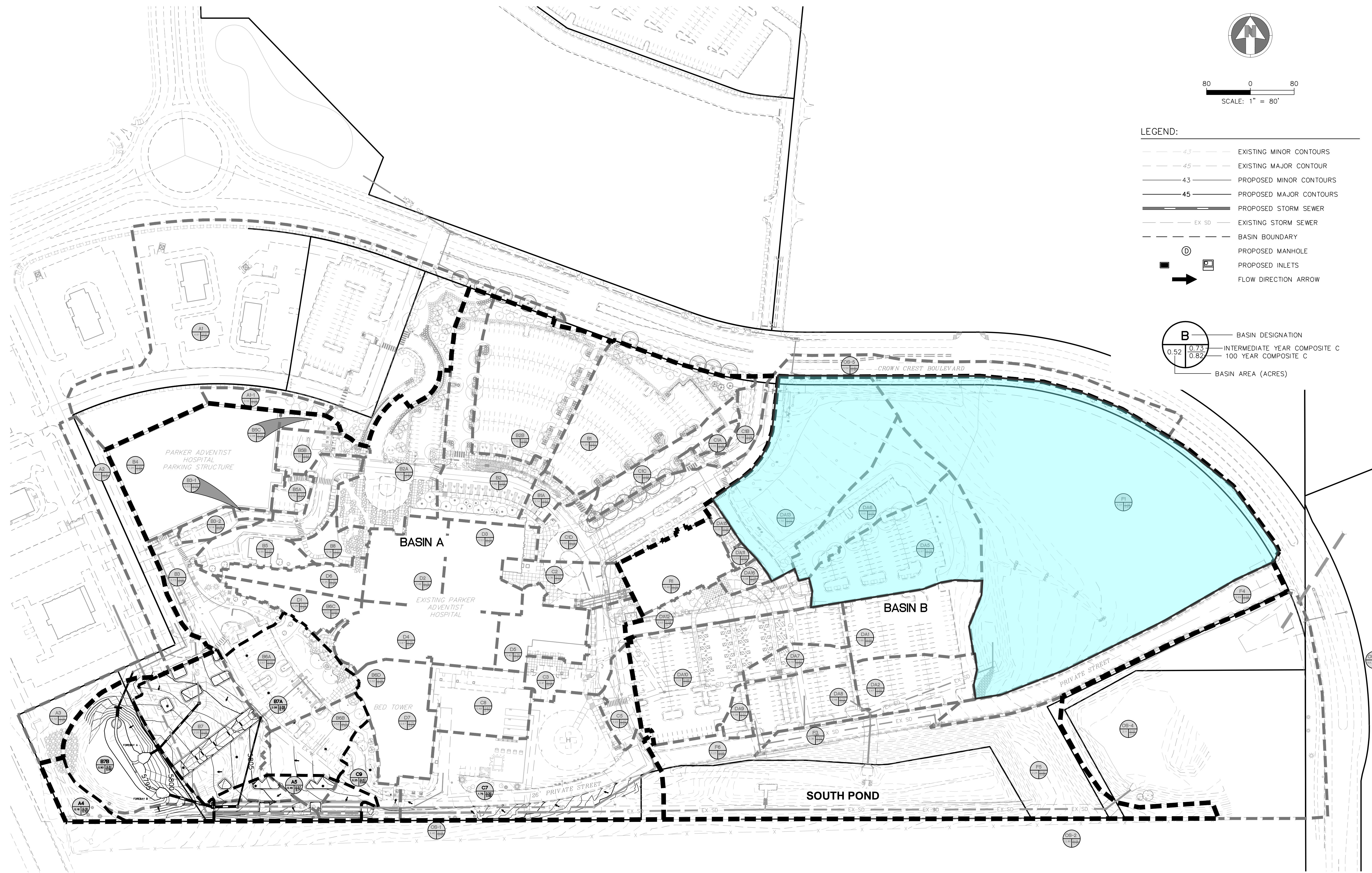
S.A. MIRO INC.
CONSULTING ENGINEERS
4582 South Ulster Street Pkwy.
Suite 750 Denver, CO 80237
ph. 303-741-3737
fax 303-694-3134



Know what's **below.**
Call before you dig.



- LEGEND:**
- 43--- EXISTING MINOR CONTOURS
 - 45--- EXISTING MAJOR CONTOUR
 - 43— PROPOSED MINOR CONTOURS
 - 45— PROPOSED MAJOR CONTOURS
 - — — EX SD — EXISTING STORM SEWER
 - — — BASIN BOUNDARY
 - ⊕ PROPOSED MANHOLE
 - PROPOSED INLETS
 - FLOW DIRECTION ARROW
-
- B** — BASIN DESIGNATION
- | | | |
|------|------|-------------------------------|
| 0.52 | 0.73 | INTERMEDIATE YEAR COMPOSITE C |
| | 0.82 | 100 YEAR COMPOSITE C |
- BASIN AREA (ACRES)



| DATE | DESCRIPTION |
|------|-------------|
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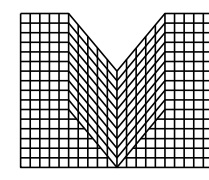
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NOT FOR CONSTRUCTION

| | |
|--------------------|--|
| CLIENT NAME: | PARKER ADVENTIST HOSPITAL |
| PROJECT NAME: | PARKER MOB III 9403 CROWN CREST BLVD. |
| DRAWING TITLE: | HISTORIC DRAINAGE MAP |
| DESIGNED BY: | DAT |
| DRAWN BY: | DAT |
| CHECKED BY: | MHV |
| DATE: | 07/30/2018 |
| MIRO JOB NUMBER: | 18057 |
| CLIENT JOB NUMBER: | |

DRAWING NUMBER:
FIG. 3

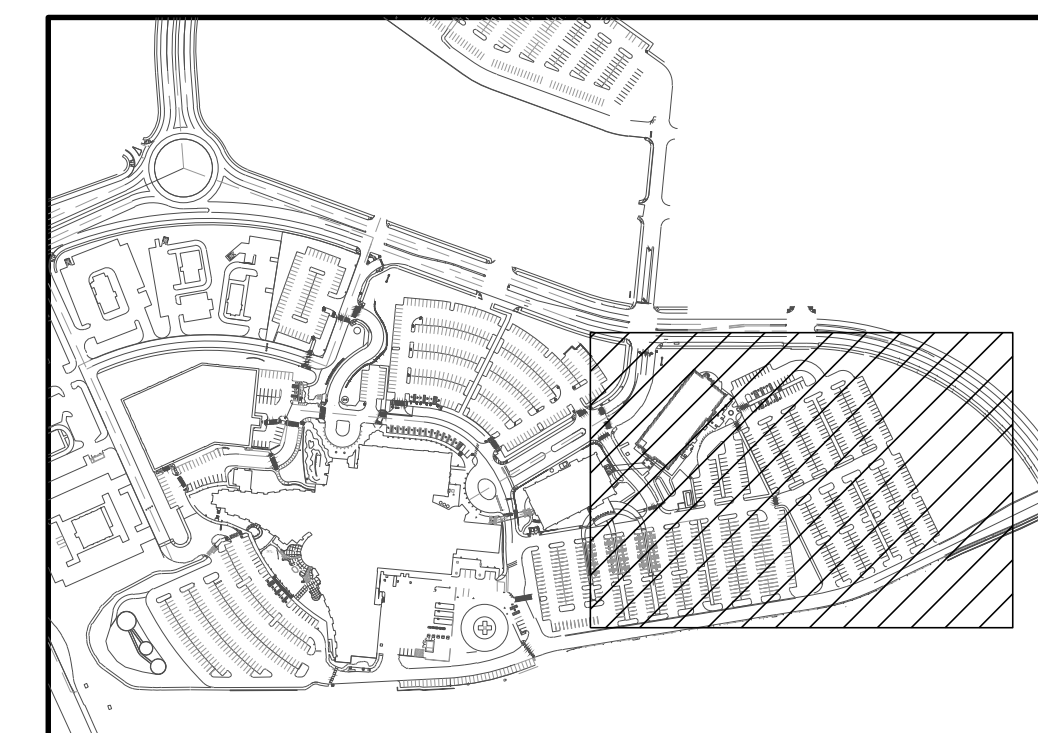
FILE PATH: J:\Jobs\15029 PKR Parking Lot Addition\04 Civil Design\Drainage\FIG.2 Overall Drainage Map.dwg - 24X36 - 8/8/2018



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Suite 750 Denver, CO 80237
ph. 303-741-3737
fax 303-694-3134

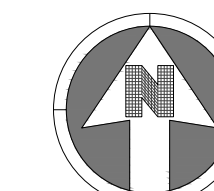


Know what's below.
Call before you dig.



KEY MAP

NOT TO SCALE



40 0 40

SCALE: 1" = 40'

NOTES:

- SEE SHEET C-001 FOR CIVIL NOTES AND LEGEND.

LEGEND:

- - - - - 43 - - - - - EXISTING MINOR CONTOURS
- - - - - 45 - - - - - EXISTING MAJOR CONTOUR
- - - - - 43 - - - - - PROPOSED MINOR CONTOURS
- - - - - 45 - - - - - PROPOSED MAJOR CONTOURS
- - - - - PROPOSED STORM SEWER
- - - - - EX - SD - - - - - EXISTING STORM SEWER
- - - - - BASIN BOUNDARY
- ⊙ PROPOSED MANHOLE
- PROPOSED INLETS
- FLOW DIRECTION ARROW
- △ XX DESIGN POINT DESIGNATION
- ⊙ B BASIN DESIGNATION
- ⊙ 0.52 0.73 0.82 INTERMEDIATE YEAR COMPOSITE C
100 YEAR COMPOSITE C
- ⊙ BASIN AREA (ACRES)

RUNOFF SUMMARY

| DESIGN POINT | TRIBUTARY BASINS | TRIBUTARY AREA (ac.) | DIRECT RUNOFF | | TOTAL RUNOFF | |
|--------------|------------------------------|----------------------|---------------|-------------|--------------|-----------------|
| | | | Q-5 (cfs) | Q-100 (cfs) | Q-5 (cfs) | Q-100 PEAK(cfs) |
| 1 | E1, E2, DA11, DA15, DA16 | 1.07 | - | - | 1.71 | 5.25 |
| 2 | E6, E7 | 0.99 | 1.39 | 3.56 | 1.44 | 4.45 |
| 3 | E6, E7, E8 | 1.09 | 0.27 | 0.63 | 1.66 | 4.94 |
| 4 | E6-E8, E4 | 1.42 | 0.66 | 1.96 | 2.36 | 6.52 |
| 5 | E6-E8, E3, E4 | 1.63 | 0.63 | 1.44 | 2.82 | 7.57 |
| 6 | E6-E8, E3, E4, DA1 | 2.01 | 1.69 | 3.91 | 4.24 | 10.87 |
| 7 | E3-E8, DA1 | 2.67 | 0.97 | 2.24 | 5.05 | 12.73 |
| 8 | E1-E8, DA1, DA11, DA15, DA16 | 3.74 | - | - | 6.68 | 17.80 |
| 9 | F1, E12, E13 | 2.55 | 0.98 | 2.05 | 1.90 | 8.54 |
| 10 | E14 | 0.49 | 1.90 | 3.74 | 1.90 | 3.74 |
| 11 | F1, E12-E14 | 3.04 | - | - | 3.13 | 10.95 |
| 12 | F1, E11-E14 | 3.67 | 2.46 | 4.83 | 4.69 | 13.98 |
| 13 | E9, E10 | 1.13 | 2.24 | 3.44 | 3.91 | 7.94 |
| 14 | F1, E9-E14 | 4.80 | - | - | 7.34 | 19.34 |
| 15 | DP8, DP14 | 8.54 | - | - | 22.06 | 53.50 |

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TOWN OF PARKER, DIRECTOR OF ENGINEERING

DATE

| REV. | DESCRIPTION |
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| 6 | |
| 7 | |
| 8 | |

CLIENT NAME: **PARKER ADVENTIST HOSPITAL**
PROJECT NAME: **PARKER MOB III**
DRAWING TITLE: **9403 CROWN CREST BLVD. DRAINAGE MAP**

FILE PATH: J:\Jobs\18057 Parker MOB III\04 Civil Design\Drainage\Drainage Plan Fig-01.dwg Fig-1.0 - 10/17/2018

NOT FOR CONSTRUCTION

DESIGNED BY: DAT
DRAWN BY: DAT
CHECKED BY: MHV
DATE: 10/15/2018
MIRO JOB NUMBER: 18057
CLIENT JOB NUMBER:

DRAWING NUMBER:

FIG. 1

