# SUM-76/77-11.31/11.30

# Akron Central Interchange

# Drainage Report

Prepared by:

Burgess & Niple, Inc.

May 1, 2019

# Drainage Narrative SUM-76/77-11.32/11.30

Storm Sewer

Test holes were done to locate the existing median sewer along SR 8 at the proposed Heritage Trail Bridge and the Ramp N bridge. Based on the outcome of these test holes it is necessary to reroute the sewer to avoid conflict with the proposed bridge piers in both locations.

Pipe lining has been limited to only the 48" radius bend near station 4321+25 on SR 8 per the Stage 1 comments.

At the time of this submittal there were still sewers that were plugged with debris and unobservable. There are five locations:

Eastbound 76 550+00 to 556+00
Ramp T 7320+50
Brown St. & South St.
South St. in front of the County Engineer's Office
SR 8 at the very south end of the project in the median and on the right

Coordination with the City of Akron is ongoing to get these runs cleaned. Once cleaned, and surveyed, the plans will be updated accordingly.

The ditch along the south side of I-76 between Kling street and Brown Street, is very near the right of way line. As such, ditch erosion protection will not fit within the right of way. It is not required per the calculations, it is only required per the catch basin standard drawing that requires 150' upstream of the basin. The only area that drains to this ditch is the slope as the pavement drainage is contained by barrier.

On the north end of Ramp U at the gore with Ramp R, the left ditch slopes to the north. As the gore gets narrower, it is not possible to maintain a 1.5' deep ditch. Because of the slope, it is not possible grade back to the point where the ditch can be 1.5' deep. To address this, a catch basin was placed where the ditch is 1.5' deep to intercept the majority of the runoff. Another catch basin was placed further to the north that is shallower than 1.5 deep to intercept the rest of the runoff.

Where proposed storm sewers tie into existing 12" storm or combined sewers, 12" proposed sewers have been specified.

Underdrains along SR 8 are 30" due to undercut requirements from the Geotech report. Several basins along the easterly side of the of SR 8 were not deep enough to outlet the deeper underdrains. As a result, the basins were bypassed, and outlets were routed to the median inlets that do have adequate depth.

# STORM SEWER SYSTEM

**PID :** 101402 **Date :** 12/08/2017 **Project :** SUM-76/77-11.30/11.31 **Location :** Akron Central Interchange

**Description :** EB 76 517+90 Rt **Designer :** KEH

**Rainfall Area:** A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 15.00 **Tailwater Elevation (ft.):** 0.00

| JUNCTION From | JUNCTION To | STATION From To | ΔAREA ΣAREA (acres) | ΔCA ΣCA | BEGIN TIME (min.) | RAINFALL INTENSITY (10 yrs.) | RAINFALL INTENSITY (25 yrs.) | DISCHARGE (cfs.) (10 yrs.) | DISCHARGE (cfs.) (25 yrs.) | PIPE DIAM. (in.) | PIPE LENGTH (ft.) | PIPE SLOPE (ft./ft.) | F/L PIPE IN / OUT (ft.) | MEAN VEL (fps.) | JUST FULL CAPACITY (cfs.) | FRICT SLOPE (ft./ft.) | HYGR EL. IN / OUT (ft.) | COVER IN / OUT (ft.) | COVER MINUS HY GR | COVER MINUS CROWN | INLET TYPE MANNING'S 'n' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D21 | D20 | 519+90 | 0.50 | 0.45 | 10.00 | 5.10 | 6.20 | 2.3 | 2.8 | 15 | 10.0 | 0.0060 | 1047.29 | 3.58 | 4.66 | 0.0025 | 1048.22 | 1051.54 | 3.32 | 3.00 | CB 3 |
| begin | | 517+80 | 0.50 | 0.45 | | | | | | | | | 1047.23 | | | | 1048.19 | 1051.55 | | | 0.015 |

# STORM SEWER SYSTEM

**PID :** 101402 **Date :** 12/08/2017 **Project :** SUM-76/77-11.30/11.31 **Location :** Akron Central Interchange

**Description :**EB 76 521+30 Rt **Designer :** KEH

**Rainfall Area:** A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 15.00 **Tailwater Elevation (ft.):** 0.00

| JUNCTION From | JUNCTION To | STATION From To | ΔAREA ΣAREA (acres) | ΔCA ΣCA | BEGIN TIME (min.) | RAINFALL INTENSITY (10 yrs.) | RAINFALL INTENSITY (25 yrs.) | DISCHARGE (cfs.) (10 yrs.) | DISCHARGE (cfs.) (25 yrs.) | PIPE DIAM. (in.) | PIPE LENGTH (ft.) | PIPE SLOPE (ft./ft.) | F/L PIPE IN / OUT (ft.) | MEAN VEL (fps.) | JUST FULL CAPACITY (cfs.) | FRICT SLOPE (ft./ft.) | HYGR EL. IN / OUT (ft.) | COVER IN / OUT (ft.) | COVER MINUS HY GR | COVER MINUS CROWN | INLET TYPE MANNING'S 'n' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D22 | EPIPE | 521+30 | 1.16 | 1.04 | 10.00 | 5.10 | 6.19 | 5.3 | 6.5 | 15 | 15.0 | 0.0053 | 1057.27 | 4.33 | 4.40 | 0.0133 | 1058.53 | 1061.43 | 2.90 | 2.91 | I 3D |
| begin | | 521+30 | 1.16 | 1.04 | | | | | | Warning | | | 1057.19 | | | | 1058.33 | 1061.50 | | | 0.015 |

# STORM SEWER SYSTEM

**PID :** 101402 **Date :** 03/22/2019 **Project :** SUM-76/77-11.30/11.31 **Location :** Akron Central Interchange

**Description :** EB 76 Sta. 507+50 to 508+00 Right **Designer :** KEH

**Rainfall Area:** A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 15.00 **Tailwater Elevation (ft.):** 0.00

| JUNCTION From | JUNCTION To | STATION From / To | ΔAREA / ΣAREA (acres) | ΔCA / ΣCA | BEGIN TIME (min.) | RAINFALL INTENSITY (10 yrs.) | RAINFALL INTENSITY (25 yrs.) | DISCHARGE (cfs.) (10 yrs.) | DISCHARGE (cfs.) (25 yrs.) | PIPE DIAM. (in.) | PIPE LENGTH (ft.) | PIPE SLOPE (ft./ft.) | F/L PIPE IN / OUT (ft.) | MEAN VEL (fps.) | JUST FULL CAPACITY (cfs.) | FRICT SLOPE (ft./ft.) | HYGR EL. IN / OUT (ft.) | COVER IN / OUT (ft.) | COVER MINUS HY GR | COVER MINUS CROWN | INLET TYPE MANNING'S 'n' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D254 | D255 | 507+50 | 0.78 | 0.70 | 10.00 | 4.94 | 5.55 | 3.5 | 3.9 | 15 | 76.0 | 0.0061 | 1027.55 | 3.94 | 4.69 | 0.0048 | 1028.71 | 1031.80 | 3.09 | 3.00 | I 3C |
| begin | | 507+91 | 0.78 | 0.70 | | | | | | | | | 1027.09 | | | | 1028.34 | 1032.50 | | | 0.015 |
| D255 | D256 | 507+91 | 0.39 | 0.35 | 10.32 | 4.88 | 5.55 | 5.1 | 5.8 | 15 | 17.0 | 0.0082 | 1027.09 | 4.72 | 5.47 | 0.0109 | 1028.34 | 1032.50 | 4.16 | 4.16 | I 3D |
| | | 508+00 | 1.17 | 1.05 | | | | | | | | | 1026.95 | | | | 1028.06 | 1032.61 | | | 0.015 |
| D256 | EX | 508+00 | 0.00 | 0.00 | 10.38 | 4.87 | 5.52 | 5.1 | 5.8 | 15 | 72.0 | 0.0329 | 1026.95 | 8.30 | 10.93 | 0.0108 | 1027.63 | 1032.61 | 4.98 | 4.41 | MH 3 |
| final | | 508+45 | 1.17 | 1.05 | | | | | | | | | 1024.58 | | | | 1025.69 | 1033.91 | | | 0.015 |

# STORM SEWER SYSTEM

**PID :** 101402 **Date :** 03/25/2019 **Project :** SUM-76/77-11.30/11.31 **Location :** Akron Central Interchange

**Description :** EB 76 Sta. 512+30 to 512+55 **Designer :** KEH

**Rainfall Area:** A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 15.00 **Tailwater Elevation (ft.):** 0.00

| JUNCTION From | JUNCTION To | STATION From To | ΔAREA ΣAREA (acres) | ΔCA ΣCA | BEGIN TIME (min.) | RAINFALL INTENSITY (10 yrs.) | RAINFALL INTENSITY (25 yrs.) | DISCHARGE (cfs.) (10 yrs.) | DISCHARGE (cfs.) (25 yrs.) | PIPE DIAM. (in.) | PIPE LENGTH (ft.) | PIPE SLOPE (ft./ft.) | F/L PIPE IN / OUT (ft.) | MEAN VEL (fps.) | JUST FULL CAPACITY (cfs.) | FRICT SLOPE (ft./ft.) | HYGR EL. IN / OUT (ft.) | COVER IN / OUT (ft.) | COVER MINUS HY GR | COVER MINUS CROWN | INLET TYPE MANNING'S 'n' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D259 | D260 | 512+55 | 0.50 | 0.45 | 10.00 | 4.94 | 5.61 | 2.2 | 2.5 | 15 | 25.0 | 0.0060 | 1037.07 | 3.56 | 4.66 | 0.0020 | 1037.91 | 1041.32 | 3.41 | 3.00 | I 3D |
| | begin | 512+30 | 0.50 | 0.45 | | | | | | | | | 1036.92 | | | | 1037.86 | 1041.06 | | | 0.015 |

# STORM SEWER SYSTEM

**PID :** 101402 **Date :** 03/25/2019 **Project :** SUM-76/77-11.30/11.31 **Location :** Akron Central Interchange

**Description :** WB 76 Sta. 513+25 to 513+05 **Designer :** KEH

**Rainfall Area:** A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 15.00 **Tailwater Elevation (ft.):** 0.00

| JUNCTION From | JUNCTION To | STATION From To | ΔAREA ΣAREA (acres) | ΔCA ΣCA | BEGIN TIME (min.) | RAINFALL INTENSITY (10 yrs.) | RAINFALL INTENSITY (25 yrs.) | DISCHARGE (cfs.) (10 yrs.) | DISCHARGE (cfs.) (25 yrs.) | PIPE DIAM. (in.) | PIPE LENGTH (ft.) | PIPE SLOPE (ft./ft.) | F/L PIPE IN / OUT (ft.) | MEAN VEL (fps.) | JUST FULL CAPACITY (cfs.) | FRICT SLOPE (ft./ft.) | HYGR EL. IN / OUT (ft.) | COVER IN / OUT (ft.) | COVER MINUS HY GR | COVER MINUS CROWN | INLET TYPE MANNING'S 'n' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D258 | D257 | 513+25 | 0.75 | 0.68 | 10.00 | 4.94 | 5.57 | 3.3 | 3.8 | 15 | 65.0 | 0.0060 | 1036.75 | 3.90 | 4.66 | 0.0045 | 1037.67 | 1041.25 | 3.58 | 3.25 | I 3C |
| begin | | 513+25 | 0.75 | 0.68 | | | | | | | | | 1036.36 | | | | 1037.38 | 1041.16 | | | 0.015 |
| D257 | EX | 513+25 | 0.58 | 0.46 | 10.28 | 4.89 | 5.56 | 5.5 | 6.3 | 15 | 28.0 | 0.0307 | 1036.36 | 8.24 | 10.55 | 0.0127 | 1037.09 | 1041.16 | 4.07 | 3.55 | CB 3A |
| final | | 513+05 | 1.33 | 1.13 | | | | | | | | | 1035.50 | | | | 1036.63 | 1040.50 | | | 0.015 |

# STORM SEWER SYSTEM

**PID :** 101402 **Date :** 12/08/2017 **Project :** SUM-76/77-11.30/11.31 **Location :** Akron Central Interchange

**Description :** EB 76 520+00 to 522+57 Rt, Ditch Storm **Designer :** KEH

**Rainfall Area:** A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 15.00 **Tailwater Elevation (ft.):** 0.00

| JUNCTION From | JUNCTION To | STATION From To | ΔAREA Σ AREA (acres) | ΔCA ΣCA | BEGIN TIME (min.) | RAINFALL INTENSITY (10 yrs.) | RAINFALL INTENSITY (25 yrs.) | DISCHARGE (cfs.) (10 yrs.) | DISCHARGE (cfs.) (25 yrs.) | PIPE DIAM. (in.) | PIPE LENGTH (ft.) | PIPE SLOPE (ft./ft.) | F/L PIPE IN / OUT (ft.) | MEAN VEL (fps.) | JUST FULL CAPACITY (cfs.) | FRICT SLOPE (ft./ft.) | HYGR EL. IN / OUT (ft.) | COVER IN / OUT (ft.) | COVER MINUS HY GR | COVER MINUS CROWN | INLET TYPE MANNING'S 'n' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D23 | D24 | 520+00 | 0.11 | 0.08 | 15.00 | 4.20 | 4.93 | 0.3 | 0.4 | 12 | 149.0 | 0.0060 | 1041.47 | 2.12 | 2.57 | 0.0002 | 1041.74 | 1044.47 | 2.73 | 2.00 | CB 2-2A |
| begin | | 521+50 | 0.11 | 0.08 | | | | | | | | | 1040.58 | | | | 1041.21 | 1045.83 | | | 0.015 |
| D24 | D25 | 521+50 | 0.17 | 0.12 | 16.17 | 4.04 | 4.84 | 0.8 | 0.9 | 12 | 107.0 | 0.0100 | 1040.58 | 3.30 | 3.32 | 0.0009 | 1040.96 | 1045.83 | 4.87 | 4.25 | CB 2-2A |
| final | | 522+57 | 0.28 | 0.20 | | | | | | | | | 1039.51 | | | | 1040.21 | 1044.33 | | | 0.015 |

Ex. is 12", so matched ex. size

# STORM SEWER SYSTEM

**PID :** 101402 **Date :** 07/04/2019 **Project :** SUM-76/77-11.30/11.31 **Location :** Akron Central Interchange

**Description :** EB 76 523+70 to 528+50 LT **Designer :** KEH

**Rainfall Area:** A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 15.00 **Tailwater Elevation (ft.):** 0.00

| JUNCTION From | JUNCTION To | STATION From To | ΔAREA ΣAREA (acres) | ΔCA ΣCA | BEGIN TIME (min.) | RAINFALL INTENSITY (10 yrs.) | RAINFALL INTENSITY (25 yrs.) | DISCHARGE (cfs.) (10 yrs.) | DISCHARGE (cfs.) (25 yrs.) | PIPE DIAM. (in.) | PIPE LENGTH (ft.) | PIPE SLOPE (ft./ft.) | F/L PIPE IN / OUT (ft.) | MEAN VEL (fps.) | JUST FULL CAPACITY (cfs.) | FRICT SLOPE (ft./ft.) | HYGR EL. IN / OUT (ft.) | COVER IN / OUT (ft.) | COVER MINUS HY GR | COVER MINUS CROWN | INLET TYPE MANNING'S 'n' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D30 | D29 | 526+00 | 0.10 | 0.09 | 10.00 | 4.94 | 4.71 | 0.4 | 0.4 | 15 | 53.0 | 0.0060 | 1075.76 | 2.28 | 4.68 | 0.0001 | 1076.22 | 1080.01 | 3.79 | 3.00 | I 3D |
| begin | | 525+50 | 0.10 | 0.09 | | | | | | | | | 1075.44 | | | | 1076.22 | 1080.10 | | | 0.015 |
| D27 | D29 | 525+50 | 0.22 | 0.20 | 10.00 | 4.94 | 5.62 | 1.0 | 1.1 | 15 | 13.0 | 0.0200 | 1075.70 | 4.38 | 8.52 | 0.0004 | 1076.28 | 1081.66 | 5.38 | 4.71 | I 3D |
| begin | | 525+50 | 0.32 | 0.29 | | | | | | | | | 1075.44 | | | | 1076.27 | 1080.10 | | | 0.015 |
| D29 | D43 | 525+10 | 0.32 | 0.22 | 15.00 | 4.13 | 4.71 | 2.1 | 2.4 | 15 | 38.0 | 0.0061 | 1075.44 | 3.52 | 4.69 | 0.0019 | 1076.22 | 1080.10 | 3.88 | 3.41 | CB 2-2A |
| | | 525+00 | 0.64 | 0.51 | | | | | | | | | 1075.21 | | | | 1076.15 | 1080.16 | | | 0.015 |
| D28 | D43 | 525+00 | 0.01 | 0.01 | 15.00 | 4.13 | 4.63 | 0.0 | 0.0 | 15 | 44.0 | 0.0066 | 1075.50 | 1.03 | 4.89 | 0.0000 | 1075.87 | 1077.55 | 1.68 | 0.80 | CB 2-2A |
| begin | | 525+10 | 0.65 | 0.52 | | | | | | | | | 1075.21 | | | | 1075.87 | 1080.16 | | | 0.015 |
| D261 | D262 | 523+75 | 0.15 | 0.14 | 10.00 | 4.94 | 4.67 | 0.7 | 0.6 | 15 | 77.0 | 0.0060 | 1068.09 | 2.56 | 4.65 | 0.0001 | 1068.74 | 1072.59 | 3.85 | 3.25 | I 3C |
| begin | | 524+50 | 0.80 | 0.65 | | | | | | | | | 1067.63 | | | | 1068.73 | 1076.50 | | | 0.015 |
| D262 | D263 | 524+50 | 0.25 | 0.18 | 15.00 | 4.13 | 4.67 | 1.3 | 1.4 | 15 | 41.0 | 0.0059 | 1067.63 | 3.05 | 4.61 | 0.0007 | 1068.73 | 1076.50 | 7.77 | 7.62 | CB 2-2A |
| | | 524+95 | 1.05 | 0.83 | | | | | | | | | 1067.39 | | | | 1068.70 | 1078.57 | | | 0.015 |
| D26 | D31 | 528+50 | 0.38 | 0.34 | 10.00 | 4.94 | 5.50 | 1.7 | 1.9 | 15 | 247.0 | 0.0366 | 1081.58 | 6.39 | 11.53 | 0.0011 | 1081.93 | 1085.83 | 3.90 | 3.00 | I 3D |
| begin | | 526+03 | 1.43 | 1.17 | | | | | | | | | 1072.53 | | | | 1073.43 | 1077.78 | | | 0.015 |
| EX | D31 | 525+97 | 0.09 | 0.05 | 15.00 | 4.13 | 4.71 | 0.2 | 0.2 | 15 | 40.0 | 0.0313 | 1069.75 | 3.13 | 10.65 | 0.0000 | 1069.88 | 1077.53 | 7.65 | 6.53 | CB 5 |
| begin | | 526+00 | 1.52 | 1.22 | | | | | | | | | 1068.50 | | | | 1069.21 | 1077.78 | | | 0.015 |

# STORM SEWER SYSTEM

| JUNCTION From | JUNCTION To | STATION From To | ΔAREA ΣAREA (acres) | ΔCA ΣCA | BEGIN TIME (min.) | RAINFALL INTENSITY (10 yrs.) | RAINFALL INTENSITY (25 yrs.) | DISCHARGE (cfs.) (10 yrs.) | DISCHARGE (cfs.) (25 yrs.) | PIPE DIAM. (in.) | PIPE LENGTH (ft.) | PIPE SLOPE (ft./ft.) | F/L PIPE IN / OUT (ft.) | MEAN VEL (fps.) | JUST FULL CAPACITY (cfs.) | FRICT SLOPE (ft./ft.) | HYGR EL. IN / OUT (ft.) | COVER IN / OUT (ft.) | COVER MINUS HY GR | COVER MINUS CROWN | INLET TYPE MANNING'S 'n' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D31 | D263 | 526+03 | 0.17 | 0.15 | 15.21 | 4.10 | 4.67 | 2.2 | 2.5 | 15 | 37.0 | 0.0300 | 1068.50 | 6.41 | 10.43 | 0.0020 | 1068.94 | 1077.78 | 8.84 | 8.03 | I 3D |
| | | 524+97 | 1.69 | 1.37 | | | | | | | | | 1067.39 | | | | 1068.70 | 1078.57 | | | 0.015 |
| D263 | D43 | 525+95 | 0.44 | 0.40 | 15.31 | 4.09 | 4.67 | 5.1 | 5.8 | 15 | 39.0 | 0.0056 | 1067.39 | 4.15 | 4.52 | 0.0108 | 1068.70 | 1078.57 | 9.87 | 9.93 | I 3D |
| | | 525+95 | 2.13 | 1.77 | | | | | | Warning | | | 1067.17 | | | | 1068.28 | 1080.16 | | | 0.015 |
| D43 | D275 | 525+10 | 0.00 | 0.00 | 15.71 | 4.04 | 4.62 | 7.1 | 8.1 | 15 | 64.0 | 0.0250 | 1067.17 | 8.03 | 9.52 | 0.0211 | 1068.12 | 1080.16 | 12.04 | 11.74 | MH 3 |
| | | 525+10 | 2.13 | 1.77 | | | | | | | | | 1065.57 | | | | 1066.76 | 1075.90 | | | 0.015 |
| D275 | D276 | 525+10 | 0.55 | 0.50 | 15.84 | 4.02 | 4.61 | 9.1 | 10.4 | 15 | 39.0 | 0.4046 | 1065.57 | 24.28 | 38.31 | 0.0346 | 1066.03 | 1075.90 | 9.87 | 9.08 | I 3D |
| final | | 24+25 | 2.68 | 2.26 | | | | | | | | | 1049.79 | | | | 1051.01 | 1061.50 | | | 0.015 |

# STORM SEWER SYSTEM

**PID :** 101402 **Date :** 04/03/2019 **Project :** SUM-76/77-11.30/11.31 **Location :** Akron Central Interchange

**Description :** EB 76 Sta. 550+50 RT **Designer :** KEH

**Rainfall Area:** A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 15.00 **Tailwater Elevation (ft.):** 0.00

| JUNCTION From | JUNCTION To | STATION From / To | ΔAREA / ΣAREA (acres) | ΔCA / ΣCA | BEGIN TIME (min.) | RAINFALL INTENSITY (10 yrs.) | RAINFALL INTENSITY (25 yrs.) | DISCHARGE (cfs.) (10 yrs.) | DISCHARGE (cfs.) (25 yrs.) | PIPE DIAM. (in.) | PIPE LENGTH (ft.) | PIPE SLOPE (ft./ft.) | F/L PIPE IN / OUT (ft.) | MEAN VEL (fps.) | JUST FULL CAPACITY (cfs.) | FRICT SLOPE (ft./ft.) | HYGR EL. IN / OUT (ft.) | COVER IN / OUT (ft.) | COVER MINUS HY GR | COVER MINUS CROWN | INLET TYPE MANNING'S 'n' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D224 | BEND | 550+50 | 0.44 | 0.40 | 10.00 | 4.94 | 5.62 | 2.0 | 2.2 | 15 | 10.0 | 0.0100 | 1116.53 | 4.16 | 6.02 | 0.0016 | 1117.37 | 1120.78 | 3.41 | 3.00 | I 3D |
| begin | | 550+50 | 0.44 | 0.40 | | | | | | | | | 1116.43 | | | | 1117.35 | 1120.00 | | | 0.015 |
| BEND | BEND | 550+50 | 0.00 | 0.00 | 10.04 | 4.94 | 5.62 | 2.0 | 2.2 | 15 | 25.0 | 0.5864 | 1116.43 | 17.78 | 46.12 | 0.0016 | 1116.62 | 1120.00 | 3.38 | 2.32 | MH 3 |
| | | 550+50 | 0.44 | 0.40 | | | | | | | | | 1101.77 | | | | 1102.69 | 1104.00 | | | 0.015 |
| BEND | OUT | 550+50 | 0.00 | 0.00 | 10.06 | 4.93 | 5.61 | 2.0 | 2.2 | 15 | 15.0 | 0.0100 | 1101.77 | 4.15 | 6.02 | 0.0016 | 1102.57 | 1104.00 | 1.43 | 0.98 | MH 3 |
| final | | 550+50 | 0.44 | 0.40 | | | | | | | | | 1101.62 | | | | 1102.54 | 1104.00 | | | 0.015 |

# STORM SEWER SYSTEM

**PID :** 101402 **Date :** 04/03/2019 **Project :** SUM-76/77-11.30/11.31 **Location :** Akron Central Interchange

**Description :** EB 76 Sta. 555+50 RT **Designer :** KEH

**Rainfall Area:** A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 15.00 **Tailwater Elevation (ft.):** 0.00

| JUNCTION From | JUNCTION To | STATION From / To | ΔAREA / ΣAREA (acres) | ΔCA / ΣCA | BEGIN TIME (min.) | RAINFALL INTENSITY (10 yrs.) | RAINFALL INTENSITY (25 yrs.) | DISCHARGE (cfs.) (10 yrs.) | DISCHARGE (cfs.) (25 yrs.) | PIPE DIAM. (in.) | PIPE LENGTH (ft.) | PIPE SLOPE (ft./ft.) | F/L PIPE IN / OUT (ft.) | MEAN VEL (fps.) | JUST FULL CAPACITY (cfs.) | FRICT SLOPE (ft./ft.) | HYGR EL. IN / OUT (ft.) | COVER IN / OUT (ft.) | COVER MINUS HY GR | COVER MINUS CROWN | INLET TYPE MANNING'S 'n' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D224 | BEND | 555+50 | 0.63 | 0.57 | 10.00 | 4.94 | 5.62 | 2.8 | 3.2 | 15 | 13.0 | 0.0100 | 1125.76 | 4.56 | 6.02 | 0.0032 | 1126.66 | 1133.01 | 6.35 | 6.00 | I 3D |
| begin | | 555+50 | 0.63 | 0.57 | | | | | | | | | 1125.63 | | | | 1126.61 | 1133.00 | | | 0.015 |
| BEND | BEND | 555+50 | 0.00 | 0.00 | 10.05 | 4.93 | 5.62 | 2.8 | 3.2 | 15 | 21.0 | 0.3910 | 1125.63 | 17.11 | 37.66 | 0.0032 | 1125.88 | 1133.00 | 7.12 | 6.12 | MH 3 |
| | | 555+50 | 0.63 | 0.57 | | | | | | | | | 1117.42 | | | | 1118.40 | 1120.00 | | | 0.015 |
| BEND | OUT | 555+50 | 0.00 | 0.00 | 10.07 | 4.93 | 5.61 | 2.8 | 3.2 | 15 | 10.0 | 0.0100 | 1117.42 | 4.56 | 6.02 | 0.0032 | 1118.34 | 1120.00 | 1.66 | 1.33 | MH 3 |
| final | | 555+50 | 0.63 | 0.57 | | | | | | | | | 1117.32 | | | | 1118.30 | 1120.00 | | | 0.015 |

# STORM SEWER SYSTEM

**PID :** 101402 **Date :** 03/28/2019 **Project :** SUM-76/77-11.30/11.31 **Location :** Akron Central Interchange

**Description :**76 WN 540+20 TO 541+02 **Designer :** KEH

**Rainfall Area:** A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 15.00 **Tailwater Elevation (ft.):** 0.00

| JUNCTION From | JUNCTION To | STATION From To | ΔAREA ΣAREA (acres) | ΔCA ΣCA | BEGIN TIME (min.) | RAINFALL INTENSITY (10 yrs.) | RAINFALL INTENSITY (25 yrs.) | DISCHARGE (cfs.) (10 yrs.) | DISCHARGE (cfs.) (25 yrs.) | PIPE DIAM. (in.) | PIPE LENGTH (ft.) | PIPE SLOPE (ft./ft.) | F/L PIPE IN / OUT (ft.) | MEAN VEL (fps.) | JUST FULL CAPACITY (cfs.) | FRICT SLOPE (ft./ft.) | HYGR EL. IN / OUT (ft.) | COVER IN / OUT (ft.) | COVER MINUS HY GR | COVER MINUS CROWN | INLET TYPE MANNING'S 'n' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EXCB | D12 | 541+02 | 0.73 | 0.57 | 15.00 | 4.13 | 4.65 | 2.3 | 2.6 | 12 | 72.0 | 0.0097 | 1085.00 | 4.28 | 3.28 | 0.0073 | 1085.83 | 1088.55 | 2.72 | 2.55 | CB 5 |
| begin | | 540+91 | 0.73 | 0.57 | | | | | | | | | 1084.30 | | | | 1085.30 | 1091.94 | | | 0.015 |
| D12 | EXMH | 540+91 | 0.66 | 0.49 | 15.28 | 4.09 | 4.65 | 4.3 | 4.9 | 15 | 73.0 | 0.0063 | 1084.05 | 4.13 | 4.78 | 0.0078 | 1085.30 | 1091.94 | 6.64 | 6.64 | CB 5 |
| final | | 540+20 | 1.39 | 1.06 | | | | | | | | | 1083.59 | | | | 1084.67 | 1090.22 | | | 0.015 |

# STORM SEWER SYSTEM

**PID :** 101402 **Date :** 03/13/2019 **Project :** SUM-76/77-11.30/11.31 **Location :** Akron Central Interchange

**Description :** WB 76 550+50 Median Inlet to shoulder inlet to ex. **Designer :** KEH

**Rainfall Area:** A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 15.00 **Tailwater Elevation (ft.):** 0.00

| JUNCTION From | JUNCTION To | STATION From / To | ΔAREA / ΣAREA (acres) | ΔCA / ΣCA | BEGIN TIME (min.) | RAINFALL INTENSITY (10 yrs.) | RAINFALL INTENSITY (25 yrs.) | DISCHARGE (cfs.) (10 yrs.) | DISCHARGE (cfs.) (25 yrs.) | PIPE DIAM. (in.) | PIPE LENGTH (ft.) | PIPE SLOPE (ft./ft.) | F/L PIPE IN / OUT (ft.) | MEAN VEL (fps.) | JUST FULL CAPACITY (cfs.) | FRICT SLOPE (ft./ft.) | HYGR EL. IN / OUT (ft.) | COVER IN / OUT (ft.) | COVER MINUS HY GR | COVER MINUS CROWN | INLET TYPE MANNING'S 'n' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D61 | D61A | 550+50 | 0.08 | 0.07 | 10.00 | 4.94 | 5.57 | 0.4 | 0.4 | 15 | 73.0 | 0.0364 | 1118.18 | 4.00 | 11.50 | 0.0001 | 1118.35 | 1122.43 | 4.08 | 3.00 | I 3C |
| begin | | 550+70 | 0.08 | 0.07 | | | | | | | | | 1115.52 | | | | 1116.27 | 1119.45 | | | 0.015 |
| D61A | D109 | 550+70 | 0.39 | 0.35 | 10.30 | 4.88 | 5.56 | 2.1 | 2.4 | 15 | 36.0 | 0.6408 | 1115.52 | 18.61 | 48.21 | 0.0018 | 1115.71 | 1119.45 | 3.74 | 2.68 | I 3D |
| final | | 550+70 | 0.47 | 0.42 | | | | | | | | | 1092.45 | | | | 1093.38 | 1097.40 | | | 0.015 |

# STORM SEWER SYSTEM

**PID :** 101402 **Date :** 03/13/2019 **Project :** SUM-76/77-11.30/11.31 **Location :** Akron Central Interchange

**Description :** WB 76 553+50 to 555+25 **Designer :** KEH

**Rainfall Area:** A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 15.00 **Tailwater Elevation (ft.):** 0.00

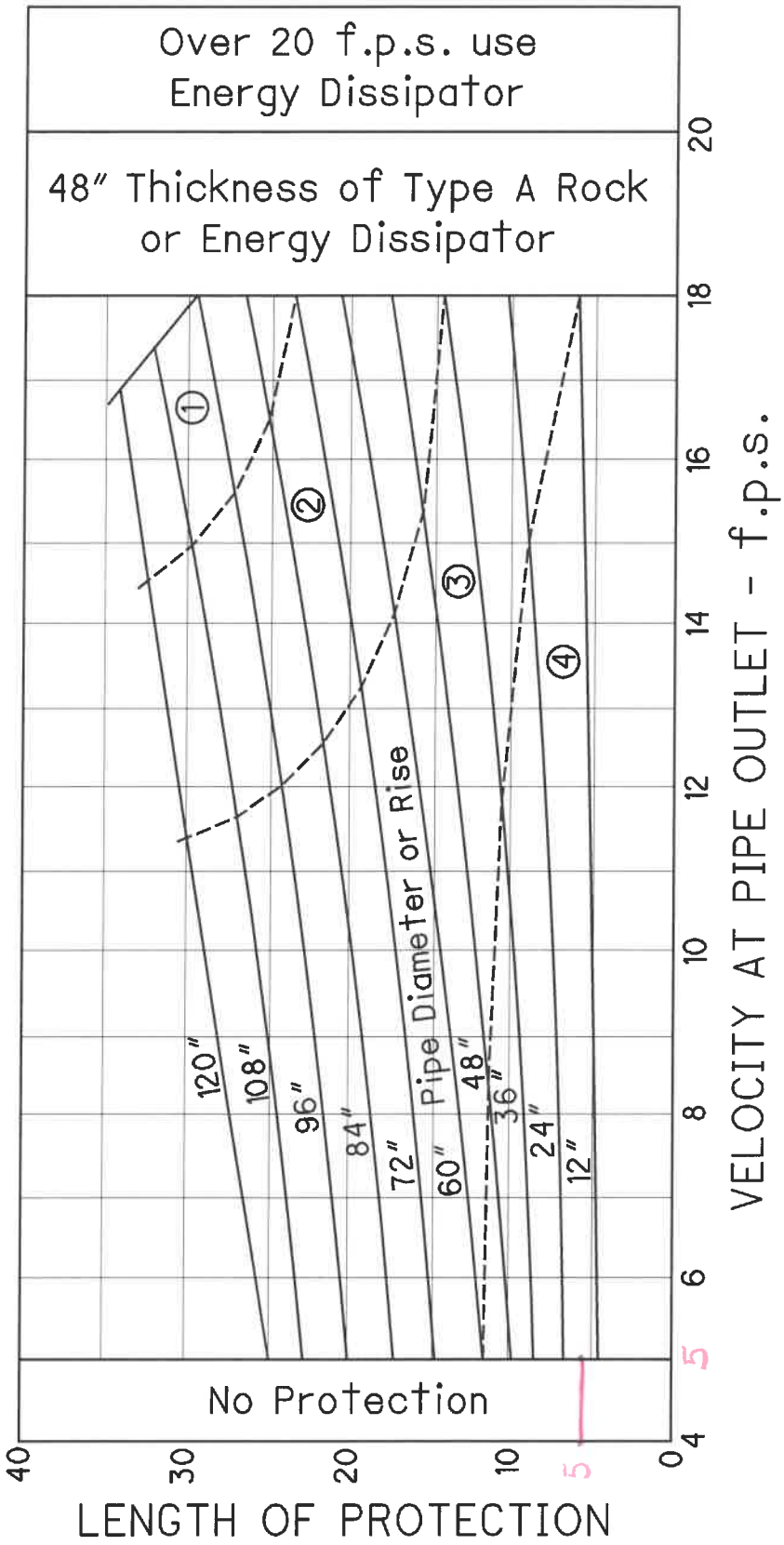
| JUNCTION From | JUNCTION To | STATION From / To | ΔAREA / ΣAREA (acres) | ΔCA / ΣCA | BEGIN TIME (min.) | RAINFALL INTENSITY (10 yrs.) | RAINFALL INTENSITY (25 yrs.) | DISCHARGE (cfs.) (10 yrs.) | DISCHARGE (cfs.) (25 yrs.) | PIPE DIAM. (in.) | PIPE LENGTH (ft.) | PIPE SLOPE (ft./ft.) | F/L PIPE IN / OUT (ft.) | MEAN VEL (fps.) | JUST FULL CAPACITY (cfs.) | FRICT SLOPE (ft./ft.) | HYGR EL. IN / OUT (ft.) | COVER IN / OUT (ft.) | COVER MINUS HY GR | COVER MINUS CROWN | INLET TYPE MANNING'S 'n' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D112 | D113 | 555+25 | 0.05 | 0.05 | 10.00 | 4.94 | 5.40 | 0.2 | 0.2 | 15 | 175.0 | 0.0147 | 1125.77 | 2.56 | 7.31 | 0.0000 | 1125.93 | 1130.19 | 4.26 | 3.17 | I 3C |
| begin | | 553+50 | 0.05 | 0.05 | | | | | | | | | 1123.19 | | | | 1123.91 | 1127.71 | | | 0.015 |
| D113 | D114 | 553+50 | 0.12 | 0.11 | 11.14 | 4.73 | 5.33 | 0.7 | 0.8 | 15 | 62.0 | 0.0156 | 1123.19 | 3.68 | 7.53 | 0.0002 | 1123.48 | 1127.71 | 4.23 | 3.27 | I 3C |
| | | 553+50 | 0.17 | 0.15 | | | | | | | | | 1122.22 | | | | 1123.17 | 1126.47 | | | 0.015 |
| D114 | B1 | 553+50 | 0.41 | 0.37 | 11.42 | 4.68 | 5.33 | 2.4 | 2.8 | 15 | 7.0 | 0.0043 | 1122.22 | 3.19 | 3.94 | 0.0025 | 1123.17 | 1126.47 | 3.30 | 3.00 | I 3D |
| | | 553+50 | 0.58 | 0.52 | | | | | | | | | 1122.19 | | | | 1123.15 | 1125.00 | | | 0.015 |
| B1 | B2 | 553+50 | 0.00 | 0.00 | 11.46 | 4.67 | 5.32 | 2.4 | 2.8 | 15 | 62.0 | 0.2360 | 1122.19 | 13.70 | 29.25 | 0.0025 | 1122.46 | 1125.00 | 2.54 | 1.56 | CB |
| | | 553+50 | 0.58 | 0.52 | | | | | | | | | 1107.56 | | | | 1108.52 | 1112.00 | | | 0.015 |
| B2 | D115 | 553+50 | 0.00 | 0.00 | 11.53 | 4.66 | 5.31 | 2.4 | 2.8 | 15 | 7.0 | 0.0043 | 1107.56 | 3.19 | 3.94 | 0.0025 | 1108.51 | 1112.00 | 3.49 | 3.19 | CB |
| final | | 553+50 | 0.58 | 0.52 | | | | | | | | | 1107.53 | | | | 1108.49 | 1112.00 | | | 0.015 |

Use 5 for RCP => 5' of RCP

# ROCK CHANNEL PROTECTION AT CULVERT AND STORM SEWER OUTLETS

**1107-1**

**REFERENCE SECTION**
**1107.2**




**LEGEND**

① 48″ of 18″ rock
② 36″ of 18″ rock
③ 30″ of 12″ rock
④ 18″ of 6″ rock

**ROCK TYPE**

A
A
B
C

**NOTES**

Rock size (6″, 12″, 18″) indicates the square opening on which 85% of the material, by weight, will be retained.

The width of protection shall be the width of the headwall, with 4′ being the minimum.

(Where a stream bed will withstand the calculated velocity without erosion, no rock channel protection will be required.)

# STORM SEWER SYSTEM

**PID :** 101402 **Date :** 03/14/2019 **Project :** SUM-76/77-11.30/11.31 **Location :** Akron Central Interchange

**Description :**SR 8 Sta. 4301+00 to Sta. 4302+23 **Designer :** KEH

**Rainfall Area:** A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 15.00 **Tailwater Elevation (ft.):** 0.00

| JUNCTION From | JUNCTION To | STATION From To | ΔAREA ΣAREA (acres) | ΔCA ΣCA | BEGIN TIME (min.) | RAINFALL INTENSITY (10 yrs.) | RAINFALL INTENSITY (25 yrs.) | DISCHARGE (cfs.) (10 yrs.) | DISCHARGE (cfs.) (25 yrs.) | PIPE DIAM. (in.) | PIPE LENGTH (ft.) | PIPE SLOPE (ft./ft.) | F/L PIPE IN / OUT (ft.) | MEAN VEL (fps.) | JUST FULL CAPACITY (cfs.) | FRICT SLOPE (ft./ft.) | HYGR EL. IN / OUT (ft.) | COVER IN / OUT (ft.) | COVER MINUS HY GR | COVER MINUS CROWN | INLET TYPE MANNING'S 'n' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D211 | D210 | 4301+00 | 0.90 | 0.69 | 10.00 | 4.94 | 5.55 | 3.4 | 3.8 | 15 | 132.0 | 0.0172 | 1082.30 | 5.88 | 7.90 | 0.0047 | 1082.94 | 1086.55 | 3.61 | 3.00 | CB 3 |
| begin | | 4302+23 | 0.90 | 0.69 | | | | | | | | | 1080.03 | | | | 1081.05 | 1083.50 | | | 0.015 |
| D210 | EX | 4302+23 | 0.35 | 0.27 | 10.37 | 4.87 | 5.51 | 4.7 | 5.3 | 15 | 81.0 | 0.0159 | 1080.03 | 6.16 | 7.60 | 0.0090 | 1080.84 | 1083.50 | 2.66 | 2.22 | CB 3 |
| final | | 4302+23 | 1.25 | 0.96 | | | | | | | | | 1078.74 | | | | 1079.83 | 1084.16 | | | 0.015 |

# STORM SEWER SYSTEM

**PID :** 101402 **Date :** 03/14/2019 **Project :** SUM-76/77-11.30/11.31 **Location :** Akron Central Interchange

**Description :**SR 8 Sta. 4305+25 Ramp T Sta. 7306+93 **Designer :** KEH

**Rainfall Area:** A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 15.00 **Tailwater Elevation (ft.):** 0.00

| JUNCTION From | JUNCTION To | STATION From To | ΔAREA ΣAREA (acres) | ΔCA ΣCA | BEGIN TIME (min.) | RAINFALL INTENSITY (10 yrs.) | RAINFALL INTENSITY (25 yrs.) | DISCHARGE (cfs.) (10 yrs.) | DISCHARGE (cfs.) (25 yrs.) | PIPE DIAM. (in.) | PIPE LENGTH (ft.) | PIPE SLOPE (ft./ft.) | F/L PIPE IN / OUT (ft.) | MEAN VEL (fps.) | JUST FULL CAPACITY (cfs.) | FRICT SLOPE (ft./ft.) | HYGR EL. IN / OUT (ft.) | COVER IN / OUT (ft.) | COVER MINUS HY GR | COVER MINUS CROWN | INLET TYPE MANNING'S 'n' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D209 | D208 | 4305+25 | 0.73 | 0.66 | 10.00 | 4.94 | 5.53 | 3.2 | 3.6 | 15 | 171.0 | 0.0186 | 1071.87 | 5.97 | 8.21 | 0.0042 | 1072.48 | 1076.12 | 3.64 | 3.00 | CB 3 |
| begin | | 7306+93 | 0.73 | 0.66 | | | | | | | | | 1068.69 | | | | 1069.70 | 1072.30 | | | 0.015 |
| D208 | EX | 7306+93 | 0.34 | 0.27 | 10.48 | 4.85 | 5.49 | 4.5 | 5.1 | 15 | 94.0 | 0.0302 | 1068.69 | 7.78 | 10.47 | 0.0083 | 1069.33 | 1072.30 | 2.97 | 2.36 | CB 3 |
| final | | 7307+11 | 1.07 | 0.93 | | | | | | | | | 1065.85 | | | | 1066.93 | 1072.17 | | | 0.015 |

# STORM SEWER SYSTEM

**PID :** 101402 **Date :** 03/28/2019 **Project :** SUM-76/77-11.30/11.31 **Location :** Akron Central Interchange

**Description :** Ramp M 1537+36 TO 1540+00 **Designer :** KEH

**Rainfall Area:** A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 50

**Minimum Pipe Size :** 15.00 **Tailwater Elevation (ft.):** 0.00

| JUNCTION From | JUNCTION To | STATION From / To | ΔAREA / ΣAREA (acres) | ΔCA / ΣCA | BEGIN TIME (min.) | RAINFALL INTENSITY (10 yrs.) | RAINFALL INTENSITY (50 yrs.) | DISCHARGE (cfs.) (10 yrs.) | DISCHARGE (cfs.) (50 yrs.) | PIPE DIAM. (in.) | PIPE LENGTH (ft.) | PIPE SLOPE (ft./ft.) | F/L PIPE IN / OUT (ft.) | MEAN VEL (fps.) | JUST FULL CAPACITY (cfs.) | FRICT SLOPE (ft./ft.) | HYGR EL. IN / OUT (ft.) | COVER IN / OUT (ft.) | COVER MINUS HY GR | COVER MINUS CROWN | INLET TYPE MANNING'S 'n' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D6 | D7 | 1540+50 | 1.40 | 1.14 | 15.00 | 4.13 | 5.15 | 4.7 | 5.8 | 15 | 51.0 | 0.0061 | 1061.23 | 3.82 | 4.70 | 0.0109 | 1062.59 | 1064.23 | 1.64 | 1.75 | CB 5 |
| begin | | 1540+50 | 1.40 | 1.14 | | | | | | | | | 1060.92 | | | | 1062.03 | 1064.66 | | | 0.015 |
| D7 | D112 | 1540+50 | 0.04 | 0.03 | 15.22 | 4.10 | 5.05 | 4.8 | 5.9 | 15 | 217.0 | 0.0135 | 1060.92 | 5.80 | 7.00 | 0.0111 | 1061.85 | 1064.66 | 2.81 | 2.49 | CB 5 |
| | | 1538+34 | 1.44 | 1.17 | | | | | | | | | 1057.99 | | | | 1059.11 | 1065.69 | | | 0.015 |
| D8 | D9 | 3331+00 | 0.41 | 0.37 | 10.00 | 4.94 | 6.12 | 1.8 | 2.3 | 15 | 61.0 | 0.4944 | 1088.65 | 16.28 | 42.35 | 0.0016 | 1088.85 | 1091.90 | 3.05 | 2.00 | CB 3A |
| begin | | 1538+52 | 1.85 | 1.54 | | | | | | | | | 1058.49 | | | | 1059.41 | 1066.93 | | | 0.015 |
| D9 | D112 | 1538+52 | 1.52 | 1.11 | 15.00 | 4.13 | 5.16 | 6.1 | 7.6 | 18 | 50.0 | 0.0100 | 1058.24 | 5.53 | 9.79 | 0.0070 | 1059.38 | 1066.93 | 7.55 | 7.19 | CB 5 |
| | | 1538+34 | 3.37 | 2.65 | | | | | | | | | 1057.74 | | | | 1059.03 | 1065.69 | | | 0.015 |
| D10 | D112 | 1537+50 | 0.61 | 0.44 | 15.00 | 4.13 | 5.15 | 1.8 | 2.2 | 15 | 89.0 | 0.0451 | 1062.85 | 6.98 | 12.78 | 0.0016 | 1063.22 | 1065.85 | 2.63 | 1.75 | CB 5 |
| begin | | 1538+34 | 3.98 | 3.08 | | | | | | | | | 1058.84 | | | | 1059.76 | 1065.69 | | | 0.015 |
| D112 | EXCB | 1538+34 | 0.00 | 0.00 | 15.85 | 4.02 | 5.05 | 12.4 | 15.6 | 18 | 25.0 | 0.0796 | 1057.57 | 14.41 | 27.63 | 0.0292 | 1058.41 | 1065.69 | 7.28 | 6.62 | MH 3 |
| final | | 1538+38 | 3.98 | 3.08 | | | | | | | | | 1055.58 | | | | 1057.04 | 1059.40 | | | 0.015 |

# STORM SEWER SYSTEM

**PID :** 101402 **Date :** 03/11/2019 **Project :** SUM-76/77-11.30/11.31 **Location :** Akron Central Interchange

**Description :** Ramp N 3332+25 to 3326+75; Sag at Lafollette **Designer :** KEH

**Rainfall Area:** A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 50

**Minimum Pipe Size :** 15.00 **Tailwater Elevation (ft.):** 0.00

| JUNCTION From | JUNCTION To | STATION From / To | ΔAREA / ΣAREA (acres) | ΔCA / ΣCA | BEGIN TIME (min.) | RAINFALL INTENSITY (10 yrs.) | RAINFALL INTENSITY (50 yrs.) | DISCHARGE (cfs.) (10 yrs.) | DISCHARGE (cfs.) (50 yrs.) | PIPE DIAM. (in.) | PIPE LENGTH (ft.) | PIPE SLOPE (ft./ft.) | F/L PIPE IN / OUT (ft.) | MEAN VEL (fps.) | JUST FULL CAPACITY (cfs.) | FRICT SLOPE (ft./ft.) | HYGR EL. IN / OUT (ft.) | COVER IN / OUT (ft.) | COVER MINUS HY GR | COVER MINUS CROWN | INLET TYPE MANNING'S 'n' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D4 | D3 | 3326+75 | 0.12 | 0.11 | 10.00 | 4.94 | 5.13 | 0.5 | 0.6 | 15 | 48.0 | 0.0044 | 1068.14 | 2.15 | 3.98 | 0.0001 | 1069.14 | 1072.39 | 3.25 | 3.00 | I 3D |
| begin | | 3326+27 | 0.12 | 0.11 | | | | | | | | | 1067.93 | | | | 1069.13 | 1073.18 | | | 0.015 |
| D3 | D2 | 3326+27 | 0.06 | 0.05 | 10.37 | 4.87 | 5.13 | 0.8 | 0.8 | 15 | 52.0 | 0.0044 | 1067.93 | 2.40 | 4.01 | 0.0002 | 1069.13 | 1072.18 | 3.05 | 3.00 | I 3D |
| | | 3325+75 | 0.18 | 0.16 | | | | | | | | | 1067.70 | | | | 1069.12 | 1072.43 | | | 0.015 |
| D1 | D1A | 3325+00 | 0.60 | 0.47 | 15.00 | 4.13 | 5.18 | 2.0 | 2.5 | 15 | 12.0 | 0.0292 | 1069.77 | 6.12 | 10.29 | 0.0019 | 1070.38 | 1072.09 | 1.71 | 1.07 | CB 5 |
| begin | | 3325+00 | 0.78 | 0.64 | | | | | | | | | 1069.42 | | | | 1070.36 | 1073.67 | | | 0.015 |
| D1A | D2 | 3325+00 | 0.00 | 0.00 | 15.03 | 4.13 | 5.13 | 2.0 | 2.4 | 15 | 75.0 | 0.0229 | 1069.42 | 5.61 | 9.12 | 0.0019 | 1069.88 | 1073.67 | 3.79 | 3.00 | I 3D |
| | | 3325+75 | 0.78 | 0.64 | | | | | | | | | 1067.70 | | | | 1069.12 | 1072.43 | | | 0.015 |
| D2 | D5 | 3325+75 | 0.03 | 0.03 | 15.26 | 4.10 | 5.13 | 2.7 | 3.4 | 15 | 33.0 | 0.0630 | 1068.70 | 8.84 | 15.12 | 0.0037 | 1069.12 | 1072.43 | 3.31 | 2.48 | I 3D |
| | | 3325+76 | 0.81 | 0.66 | | | | | | | | | 1066.62 | | | | 1067.62 | 1072.10 | | | 0.015 |
| D5 | ECB | 3325+76 | 0.00 | 0.00 | 15.32 | 4.09 | 5.08 | 2.7 | 3.4 | 15 | 90.0 | 0.0086 | 1066.62 | 4.26 | 5.57 | 0.0036 | 1067.35 | 1072.10 | 4.75 | 4.23 | MH 3 |
| final | | 3325+78 | 0.81 | 0.66 | | | | | | | | | 1065.85 | | | | 1066.84 | 1072.17 | | | 0.015 |

# STORM SEWER SYSTEM

**PID :** 101402 **Date :** 03/28/2019 **Project :** SUM-76/77-11.30/11.31 **Location :** Akron Central Interchange

**Description :** Ramp N 3343+00 to 3345+25 **Designer :** KEH

**Rainfall Area:** A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 50

**Minimum Pipe Size :** 15.00 **Tailwater Elevation (ft.):** 0.00

| JUNCTION From | JUNCTION To | STATION From To | ΔAREA Σ AREA (acres) | ΔCA ΣCA | BEGIN TIME (min.) | RAINFALL INTENSITY (10 yrs.) | RAINFALL INTENSITY (50 yrs.) | DISCHARGE (cfs.) (10 yrs.) | DISCHARGE (cfs.) (50 yrs.) | PIPE DIAM. (in.) | PIPE LENGTH (ft.) | PIPE SLOPE (ft./ft.) | F/L PIPE IN / OUT (ft.) | MEAN VEL (fps.) | JUST FULL CAPACITY (cfs.) | FRICT SLOPE (ft./ft.) | HYGR EL. IN / OUT (ft.) | COVER IN / OUT (ft.) | COVER MINUS HY GR | COVER MINUS CROWN | INLET TYPE MANNING'S 'n' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D18 | D17 | 3345+25 | 0.06 | 0.05 | 10.00 | 4.94 | 6.04 | 0.3 | 0.3 | 15 | 51.0 | 0.0061 | 1105.68 | 1.97 | 4.70 | 0.0000 | 1106.11 | 1109.93 | 3.82 | 3.00 | I 3D |
| begin | | 3344+73 | 0.06 | 0.05 | | | | | | | | | 1105.37 | | | | 1106.11 | 1109.58 | | | 0.015 |
| D17 | D16 | 3344+73 | 0.04 | 0.04 | 10.43 | 4.86 | 5.96 | 0.4 | 0.5 | 15 | 47.0 | 0.0060 | 1105.37 | 2.25 | 4.65 | 0.0001 | 1105.86 | 1109.58 | 3.72 | 2.96 | I 3D |
| | | 3344+25 | 0.10 | 0.09 | | | | | | | | | 1105.09 | | | | 1105.86 | 1109.78 | | | 0.015 |
| D16 | D13 | 3344+25 | 0.12 | 0.11 | 10.78 | 4.79 | 5.94 | 0.9 | 1.2 | 15 | 26.0 | 0.0200 | 1097.77 | 4.35 | 8.52 | 0.0004 | 1098.10 | 1109.78 | 11.68 | 10.76 | I 3D |
| | | 544+40 | 0.22 | 0.20 | | | | | | | | | 1097.25 | | | | 1098.09 | 1100.50 | | | 0.015 |
| D13 | D15 | 544+40 | 0.32 | 0.26 | 15.00 | 4.13 | 5.14 | 1.9 | 2.4 | 15 | 117.0 | 0.0547 | 1097.25 | 7.61 | 14.09 | 0.0018 | 1097.61 | 1100.50 | 2.89 | 2.00 | CB 5 |
| | | 543+20 | 0.54 | 0.46 | | | | | | | | | 1090.85 | | | | 1091.78 | 1095.99 | | | 0.015 |
| D14 | D15 | 3343+00 | 1.58 | 1.13 | 15.00 | 4.13 | 5.16 | 4.7 | 5.8 | 15 | 100.0 | 0.1323 | 1104.08 | 13.47 | 21.90 | 0.0109 | 1104.54 | 1106.83 | 2.29 | 1.50 | CB 5 |
| begin | | 543+20 | 2.12 | 1.59 | | | | | | | | | 1090.85 | | | | 1091.96 | 1095.99 | | | 0.015 |
| D15 | EXCB | 543+20 | 0.12 | 0.10 | 15.26 | 4.10 | 5.11 | 6.9 | 8.6 | 15 | 105.0 | 0.0430 | 1090.85 | 9.87 | 12.48 | 0.0238 | 1091.65 | 1095.99 | 4.34 | 3.89 | CB 5 |
| final | | 543+30 | 2.24 | 1.69 | | | | | | | | | 1086.34 | | | | 1087.54 | 1092.41 | | | 0.015 |

# STORM SEWER SYSTEM

**PID :** 101402 **Date :** 03/14/2019 **Project :** SUM-76/77-11.30/11.31 **Location :** Akron Central Interchange

**Description :** Ramp T Sta. 7308+25 to Sta. 7310+75 **Designer :** KEH

**Rainfall Area:** A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 50

**Minimum Pipe Size :** 15.00 **Tailwater Elevation (ft.):** 0.00

| JUNCTION From | JUNCTION To | STATION From / To | ΔAREA / ΣAREA (acres) | ΔCA / ΣCA | BEGIN TIME (min.) | RAINFALL INTENSITY (10 yrs.) | RAINFALL INTENSITY (50 yrs.) | DISCHARGE (cfs.) (10 yrs.) | DISCHARGE (cfs.) (50 yrs.) | PIPE DIAM. (in.) | PIPE LENGTH (ft.) | PIPE SLOPE (ft./ft.) | F/L PIPE IN / OUT (ft.) | MEAN VEL (fps.) | JUST FULL CAPACITY (cfs.) | FRICT SLOPE (ft./ft.) | HYGR EL. IN / OUT (ft.) | COVER IN / OUT (ft.) | COVER MINUS HY GR | COVER MINUS CROWN | INLET TYPE MANNING'S 'n' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D204 | D205 | 7310+75 | 0.42 | 0.33 | 10.00 | 4.94 | 5.92 | 1.6 | 1.9 | 15 | 109.0 | 0.0106 | 1067.72 | 4.04 | 6.21 | 0.0012 | 1068.22 | 1071.97 | 3.75 | 3.00 | CB 3 |
| begin | | 7309+65 | 0.42 | 0.33 | | | | | | | | | 1066.56 | | | | 1067.52 | 1070.81 | | | 0.015 |
| D205 | D206 | 7309+65 | 0.29 | 0.23 | 10.45 | 4.86 | 5.92 | 2.7 | 3.3 | 15 | 67.0 | 0.0043 | 1066.56 | 3.28 | 3.96 | 0.0034 | 1067.52 | 1070.81 | 3.29 | 3.00 | CB 3 |
| | | 7308+98 | 0.71 | 0.55 | | | | | | | | | 1066.27 | | | | 1067.29 | 1070.61 | | | 0.015 |
| D207 | D206 | 7308+25 | 0.19 | 0.16 | 10.00 | 4.94 | 5.92 | 0.8 | 0.9 | 15 | 72.0 | 0.0047 | 1066.61 | 2.45 | 4.14 | 0.0003 | 1067.31 | 1070.86 | 3.55 | 3.00 | CB 3 |
| begin | | 7308+98 | 0.90 | 0.71 | | | | | | | | | 1066.27 | | | | 1067.29 | 1070.61 | | | 0.015 |
| D206 | EX | 7308+98 | 0.31 | 0.25 | 10.79 | 4.79 | 5.92 | 4.6 | 5.7 | 15 | 76.0 | 0.0305 | 1066.61 | 7.83 | 10.52 | 0.0102 | 1067.29 | 1070.61 | 3.32 | 2.75 | CB 3 |
| final | | 7308+95 | 1.21 | 0.96 | | | | | | | | | 1064.29 | | | | 1065.40 | 1066.68 | | | 0.015 |

# STORM SEWER SYSTEM

**PID :** 101402 **Date :** 03/11/2019 **Project :** SUM-76/77-11.30/11.31 **Location :** Akron Central Interchange

**Description :** Ramp U 4536+25 to Ramp R 2542+90 **Designer :** KEH

**Rainfall Area:** A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 15.00 **Tailwater Elevation (ft.):** 0.00

| JUNCTION From | JUNCTION To | STATION From To | ΔAREA ΣAREA (acres) | ΔCA ΣCA | BEGIN TIME (min.) | RAINFALL INTENSITY (10 yrs.) | RAINFALL INTENSITY (25 yrs.) | DISCHARGE (cfs.) (10 yrs.) | DISCHARGE (cfs.) (25 yrs.) | PIPE DIAM. (in.) | PIPE LENGTH (ft.) | PIPE SLOPE (ft./ft.) | F/L PIPE IN / OUT (ft.) | MEAN VEL (fps.) | JUST FULL CAPACITY (cfs.) | FRICT SLOPE (ft./ft.) | HYGR EL. IN / OUT (ft.) | COVER IN / OUT (ft.) | COVER MINUS HY GR | COVER MINUS CROWN | INLET TYPE MANNING'S 'n' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D35 | D35A | 4536+50 | 0.78 | 0.59 | 15.00 | 4.13 | 4.70 | 2.4 | 2.7 | 15 | 42.0 | 0.0060 | 1077.69 | 3.62 | 4.65 | 0.0024 | 1078.80 | 1080.57 | 1.77 | 1.63 | CB 5 |
| begin | | 4536+50 | 0.78 | 0.58 | | | | | | | | | 1077.44 | | | | 1078.70 | 1081.17 | | | 0.015 |
| D35A | D36 | 4536+50 | 0.62 | 0.33 | 15.19 | 4.10 | 4.70 | 3.7 | 4.3 | 15 | 26.0 | 0.0250 | 1078.09 | 6.91 | 9.52 | 0.0059 | 1078.70 | 1082.03 | 3.33 | 2.69 | CB 5 |
| | | 4536+25 | 1.40 | 0.91 | | | | | | | | | 1077.44 | | | | 1078.48 | 1081.59 | | | 0.015 |
| D36 | D37 | 4536+25 | 0.00 | 0.00 | 15.26 | 4.10 | 4.69 | 3.7 | 4.3 | 15 | 35.0 | 0.0434 | 1077.44 | 8.47 | 12.55 | 0.0058 | 1077.96 | 1081.17 | 3.21 | 2.48 | CB 5 |
| | | 4535+93 | 1.40 | 0.91 | | | | | | | | | 1075.92 | | | | 1076.96 | 1081.15 | | | 0.015 |
| D37 | D39 | 4535+93 | 0.00 | 0.00 | 15.33 | 4.09 | 4.67 | 3.7 | 4.3 | 15 | 52.0 | 0.0190 | 1075.92 | 6.25 | 8.31 | 0.0058 | 1076.58 | 1081.15 | 4.57 | 3.98 | MH 3 |
| final | | 2542+90 | 1.40 | 0.91 | | | | | | | | | 1074.93 | | | | 1075.97 | 1080.36 | | | 0.015 |

# STORM SEWER SYSTEM

**PID :** 1 **Date :** 03/11/2019 **Project :** SUM-76/77-11.30/11.31 **Location :** Akron Central Interchange

**Description :** Ramp U 4536+25 to Ramp R 2542+90 **Designer :** KEH

**Rainfall Area:** A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 15.00 **Tailwater Elevation (ft.):** 0.00

| JUNCTION From | JUNCTION To | STATION From To | ΔAREA ΣAREA (acres) | ΔCA ΣCA | BEGIN TIME (min.) | RAINFALL INTENSITY (10 yrs.) | RAINFALL INTENSITY (25 yrs.) | DISCHARGE (cfs.) (10 yrs.) | DISCHARGE (cfs.) (25 yrs.) | PIPE DIAM. (in.) | PIPE LENGTH (ft.) | PIPE SLOPE (ft./ft.) | F/L PIPE IN / OUT (ft.) | MEAN VEL (fps.) | JUST FULL CAPACITY (cfs.) | FRICT SLOPE (ft./ft.) | HYGR EL. IN / OUT (ft.) | COVER IN / OUT (ft.) | COVER MINUS HY GR | COVER MINUS CROWN | INLET TYPE MANNING'S 'n' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D38 | D39 | 2543+30 | 0.58 | 0.52 | 15.00 | 4.13 | 4.72 | 2.2 | 2.5 | 15 | 40.0 | 0.0210 | 1072.36 | 5.59 | 8.73 | 0.0019 | 1072.83 | 1077.69 | 4.86 | 4.08 | I 3D |
| begin | | 2542+90 | 0.58 | 0.52 | | | | | | | | | 1071.52 | | | | 1072.46 | 1079.31 | | | 0.015 |

# STORM SEWER SYSTEM

**PID :** 101402 **Date :** 04/02/2019 **Project :** SUM-76/77-11.30/11.31 **Location :** Akron Central Interchange

**Description :** Ramp U 4549+28 Lt **Designer :** KEH

**Rainfall Area:** A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 15.00 **Tailwater Elevation (ft.):** 0.00

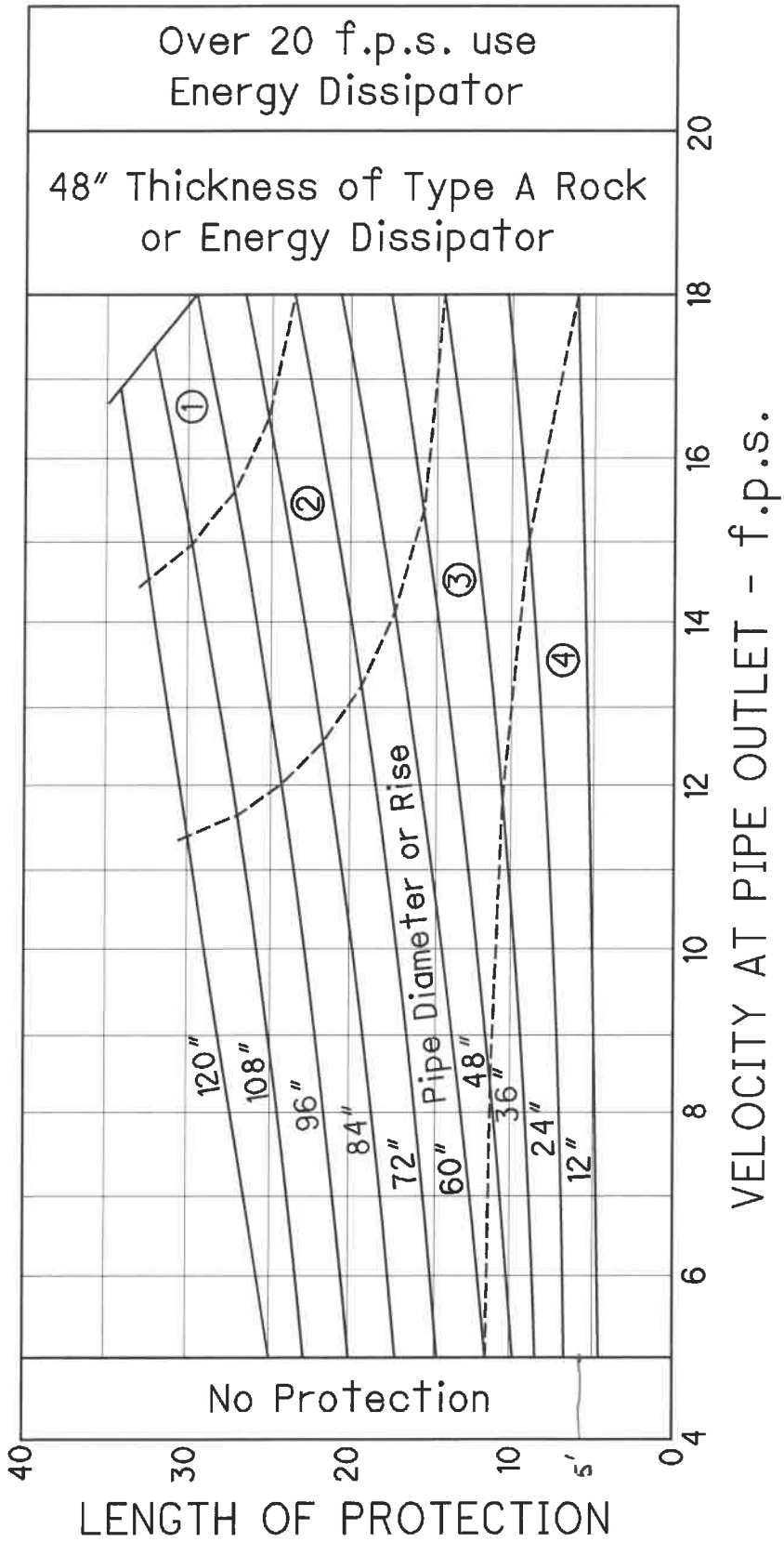
| JUNCTION From | JUNCTION To | STATION From / To | ΔAREA / ΣAREA (acres) | ΔCA / ΣCA | BEGIN TIME (min.) | RAINFALL INTENSITY (10 yrs.) | RAINFALL INTENSITY (25 yrs.) | DISCHARGE (cfs.) (10 yrs.) | DISCHARGE (cfs.) (25 yrs.) | PIPE DIAM. (in.) | PIPE LENGTH (ft.) | PIPE SLOPE (ft./ft.) | F/L PIPE IN / OUT (ft.) | MEAN VEL (fps.) | JUST FULL CAPACITY (cfs.) | FRICT SLOPE (ft./ft.) | HYGR EL. IN / OUT (ft.) | COVER IN / OUT (ft.) | COVER MINUS HY GR | COVER MINUS CROWN | INLET TYPE MANNING'S 'n' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D44 | BEND | 4547+00 | 0.59 | 0.53 | 10.00 | 4.94 | 5.63 | 2.6 | 3.0 | 15 | 6.0 | 0.0100 | 1104.83 | 4.48 | 6.02 | 0.0028 | 1105.76 | 1109.08 | 3.32 | 3.00 | CB 3A |
| begin | | 4547+00 | 0.59 | 0.53 | | | | | | | | | 1104.77 | | | | 1105.74 | 1109.00 | | | 0.015 |
| BEND | BEND | 4547+00 | 0.00 | 0.00 | 10.02 | 4.94 | 5.62 | 2.6 | 3.0 | 15 | 17.0 | 0.4859 | 1104.77 | 18.14 | 41.98 | 0.0028 | 1105.00 | 1109.00 | 4.00 | 2.98 | MH 3 |
| | | 4547+00 | 0.59 | 0.53 | | | | | | | | | 1096.51 | | | | 1097.48 | 1099.76 | | | 0.015 |
| BEND | OUT | 4547+00 | 0.00 | 0.00 | 10.04 | 4.94 | 5.62 | 2.6 | 3.0 | 15 | 6.0 | 0.0100 | 1096.51 | 4.49 | 6.02 | 0.0028 | 1097.44 | 1099.76 | 2.32 | 2.00 | MH 3 |
| final | | 4547+00 | 0.59 | 0.53 | | | | | | | | | 1096.45 | | | | 1097.42 | 1099.00 | | | 0.015 |

# ROCK CHANNEL PROTECTION AT CULVERT AND STORM SEWER OUTLETS

**1107-1**

**REFERENCE SECTION**
1107.2

Ramp U Sta. 4547+00 LT




15" w/ V ≈ 5 ft/sec

**ROCK TYPE**

| | |
|---|---|
| ① | A |
| ② | A |
| ③ | B |
| ④ | C |

**LEGEND**

① 48" of 18" rock
② 36" of 18" rock
③ 30" of 12" rock
④ 18" of 6" rock

**NOTES**

Rock size (6", 12", 18") indicates the square opening on which 85% of the material, by weight, will be retained.

The width of protection shall be the width of the headwall, with 4' being the minimum.

(Where a stream bed will withstand the calculated velocity without erosion, no rock channel protection will be required.)

# STORM SEWER SYSTEM

**PID :** 101402 **Date :** 04/02/2019 **Project :** SUM-76/77-11.30/11.31 **Location :** Akron Central Interchange

**Description :** Heritage Trail 34+88 **Designer :** KEH

**Rainfall Area:** A **Just Full Capacity Frequency (yrs.) :** 10 **Hydraulic Gradient Frequency (yrs.) :** 25

**Minimum Pipe Size :** 15.00 **Tailwater Elevation (ft.):** 0.00

| JUNCTION From | JUNCTION To | STATION From To | ΔAREA Σ AREA (acres) | ΔCA ΣCA | BEGIN TIME (min.) | RAINFALL INTENSITY (10 yrs.) | RAINFALL INTENSITY (25 yrs.) | DISCHARGE (cfs.) (10 yrs.) | DISCHARGE (cfs.) (25 yrs.) | PIPE DIAM. (in.) | PIPE LENGTH (ft.) | PIPE SLOPE (ft./ft.) | F/L PIPE IN / OUT (ft.) | MEAN VEL (fps.) | JUST FULL CAPACITY (cfs.) | FRICT SLOPE (ft./ft.) | HYGR EL. IN / OUT (ft.) | COVER IN / OUT (ft.) | COVER MINUS HY GR | COVER MINUS CROWN | INLET TYPE MANNING'S 'n' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D222 | D223 | 34+88 | 0.04 | 0.02 | 15.00 | 4.13 | 4.70 | 0.1 | 0.1 | 15 | 30.0 | 0.0153 | 1094.04 | 1.91 | 7.46 | 0.0000 | 1094.26 | 1097.04 | 2.78 | 1.75 | CB Side Di |
| begin | | 35+14 | 0.04 | 0.02 | | | | | | | | | 1093.58 | | | | 1094.26 | 1096.72 | | | 0.015 |

Area to inlet @ 33+70 (D221) much smaller than this ∴ works by inspection

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 02/05/2019 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :** EB 76 529+50 to 508+00 RT **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 10.00 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 529+50 | Begin | | | | | | | | | | | | | | | | | |
| 521+30 | I-3D | 820.00 | 0.90 | 1.20 | 2.32 | 2.82 | 10.00 | 0.0395 | 0.0400 | 0.0250 | 10.00 | 0.0400 | 4.94 | 2.20 | 3.14 | 5.34 | 0.264 | 6.61 |
| 517+90 | I-3D | 340.00 | 0.90 | 0.50 | 3.52 | 1.55 | 10.00 | 0.0200 | 0.0400 | 0.0232 | 10.00 | 0.0400 | 4.94 | 2.57 | 2.79 | 5.36 | 0.301 | 7.52 |
| 512+45 | I-3D | 545.00 | 0.90 | 0.50 | 2.80 | 2.59 | 10.00 | 0.0189 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 4.94 | 2.49 | 2.53 | 5.02 | 0.297 | 7.41 |
| 507+96 | I-3D | 449.00 | 0.90 | 0.39 | 2.80 | 2.22 | 10.00 | 0.0189 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 4.94 | 2.25 | 2.01 | 4.26 | 0.279 | 6.97 |

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 02/04/2019 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :** I-76 EB 529+50 to 526+00 **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 4.00 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 529+50 | Begin | | | | | | | | | | | | | | | | | |
| 526+00 | I-3D | 350.00 | 0.90 | 0.10 | 2.58 | 2.48 | 10.00 | 0.0300 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 4.94 | 0.43 | 0.02 | 0.44 | 0.110 | 2.74 |

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 03/04/2019 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :** WB 76 527+25 to 508+00 Left (Outside Shoulder) **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 10.00 **Allowable Depth (ft.)** 0.25

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 527+25 | Begin | | | | | | | | | | | | | | | | | |
| 521+95 | I-3D | 530.00 | 0.90 | 0.50 | 2.94 | 2.07 | 10.00 | 0.0500 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 4.94 | 1.22 | 1.01 | 2.22 | 0.182 | 4.55 |
| 518+45 | CB-3A | 350.00 | 0.85 | 0.32 | 3.06 | 1.37 | 10.00 | 0.0500 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 4.94 | 1.67 | 0.69 | 2.35 | 0.186 | 4.65 |
| 513+28 | CB-3A | 517.00 | 0.79 | 0.58 | 3.06 | 2.77 | 10.00 | 0.0189 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 4.94 | 1.84 | 1.11 | 2.95 | 0.243 | 6.08 |
| 509+55 | CB-3A | 373.00 | 0.56 | 0.87 | 14.00 | 2.06 | 16.06 | 0.0189 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 3.99 | 1.89 | 1.17 | 3.05 | 0.246 | 6.15 |
| 508+00 | CB-3A | 155.00 | 0.65 | 0.43 | 11.50 | 0.90 | 12.40 | 0.0189 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 4.51 | 1.60 | 0.82 | 2.43 | 0.226 | 5.65 |

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 02/05/2019 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :** WB 76 534+11 to 507+50 Right (Median Barrier) **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 12.00 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 534+11 | Begin | | | | | | | | | | | | | | | | | |
| 528+50 | I-3D | 561.00 | 0.90 | 0.40 | 2.94 | 2.10 | 10.00 | 0.0656 | 0.0400 | 0.0160 | 4.00 | 0.0400 | 4.94 | 1.00 | 0.78 | 1.78 | 0.159 | 3.98 |
| 526+03 | I-3D | 247.00 | 0.90 | 0.21 | 2.94 | 0.95 | 10.00 | 0.0656 | 0.0400 | 0.0160 | 4.00 | 0.0400 | 4.94 | 0.98 | 0.74 | 1.71 | 0.157 | 3.92 |
| 524+48 | I-3C | 155.00 | 0.90 | 0.14 | 3.06 | 0.70 | 10.00 | 0.0500 | 0.0400 | 0.0160 | 12.00 | 0.0400 | 4.94 | 0.89 | 0.47 | 1.36 | 0.151 | 3.79 |
| 521+98 | I-3C | 250.00 | 0.90 | 0.21 | 3.06 | 1.11 | 10.00 | 0.0500 | 0.0400 | 0.0160 | 12.00 | 0.0400 | 4.94 | 0.91 | 0.50 | 1.41 | 0.153 | 3.84 |
| 518+54 | I-3C | 344.00 | 0.90 | 0.27 | 3.06 | 1.45 | 10.00 | 0.0500 | 0.0400 | 0.0160 | 12.00 | 0.0400 | 4.94 | 1.03 | 0.68 | 1.70 | 0.165 | 4.12 |
| 513+25 | I-3C | 529.00 | 0.90 | 0.41 | 3.06 | 2.96 | 10.00 | 0.0189 | 0.0400 | 0.0160 | 12.00 | 0.0400 | 4.94 | 1.59 | 0.91 | 2.50 | 0.228 | 5.71 |
| 507+50 | I-3C | 575.00 | 0.90 | 0.39 | 3.06 | 3.19 | 10.00 | 0.0189 | 0.0400 | 0.0160 | 12.00 | 0.0400 | 4.94 | 1.65 | 1.00 | 2.65 | 0.233 | 5.83 |

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 03/01/2019 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :** WB 76 Sta. 560+48 to 547+05 Rt (Along outside of barrier) **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 10.00 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | RUNOFF AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 560+68 | Begin | | | | | | | | | | | | | | | | | |
| 553+50 | I-3D | 718.00 | 0.90 | 0.41 | 2.73 | 4.35 | 10.00 | 0.0190 | 0.0400 | 0.0160 | 12.00 | 0.0400 | 4.94 | 1.28 | 0.54 | 1.82 | 0.203 | 5.07 |
| 550+65 | I-3D | 285.00 | 0.90 | 0.39 | 2.73 | 1.57 | 10.00 | 0.0200 | 0.0400 | 0.0160 | 13.00 | 0.0400 | 4.94 | 1.48 | 0.80 | 2.28 | 0.218 | 5.45 |
| 547+05 | I-3D | 360.00 | 0.90 | 0.59 | 2.73 | 1.46 | 10.00 | 0.0345 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 4.94 | 1.72 | 1.70 | 3.42 | 0.230 | 5.74 |

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 03/01/2019 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :** WB 76 Sta. 560+48 to 548+90 Rt (Along face inside of barrier) **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 4.00 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 560+68 | Begin | | | | | | | | | | | | | | | | | |
| 556+00 | I-3C | 468.00 | 0.90 | 0.52 | 3.38 | 3.06 | 10.00 | 0.0175 | 0.0400 | 0.0160 | 4.00 | 0.0400 | 4.94 | 1.50 | 0.81 | 2.31 | 0.221 | 7.82 |
| 555+25 | I-3C | 75.00 | 0.90 | 0.05 | 2.73 | 0.56 | 10.00 | 0.0175 | 0.0400 | 0.0160 | 4.00 | 0.0400 | 4.94 | 0.87 | 0.16 | 1.03 | 0.166 | 4.39 |
| 553+50 | I-3C | 175.00 | 0.90 | 0.12 | 2.73 | 1.32 | 10.00 | 0.0190 | 0.0400 | 0.0160 | 4.00 | 0.0400 | 4.94 | 0.64 | 0.06 | 0.70 | 0.141 | 3.54 |
| 550+46 | I-3C | 304.00 | 0.90 | 0.08 | 2.73 | 2.58 | 10.00 | 0.0200 | 0.0400 | 0.0160 | 4.00 | 0.0400 | 4.94 | 0.42 | 0.00 | 0.42 | 0.115 | 2.88 |
| 548+90 | CB-3 | 156.00 | 0.90 | 0.02 | 1.11 | 1.79 | 10.00 | 0.0223 | 0.0400 | 0.0160 | 4.00 | 0.0400 | 4.94 | 0.09 | 0.00 | 0.09 | 0.064 | 1.59 |

Ex. Inlet outside full depth limits

Closest to limits as possible

For flow check only

< 0.75 cfs : Slume

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 11/29/2017 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :**SR8 4297+80 to Ex. CB at 4292+40 Left **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 8.00 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4297+80 | Begin | | | | | | | | | | | | | | | | | |
| 4292+40 | CB-3 | 540.00 | 0.79 | 0.98 | 2.41 | 2.87 | 10.00 | 0.0150 | 0.0400 | 0.0160 | 8.00 | 0.0400 | 5.10 | 2.64 | 1.30 | 3.94 | 0.283 | 7.07 |

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 03/11/2019 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :**SB SR 8 Sta. 4292+96 to 4297+62 Right (Along median barrier) **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 8.00 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4297+62 | Begin | | | | | | | | | | | | | | | | | |
| 4297+25 | I-3C | 37.00 | 0.90 | 0.04 | 2.58 | 0.83 | 10.00 | 0.0024 | 0.0400 | 0.0160 | 8.00 | 0.0400 | 4.94 | 0.18 | 0.00 | 0.18 | 0.125 | 3.12 |
| 4295+29 | I-3C | 196.00 | 0.90 | 0.18 | 2.58 | 1.54 | 10.00 | 0.0150 | 0.0400 | 0.0160 | 8.00 | 0.0400 | 4.94 | 0.73 | 0.07 | 0.80 | 0.156 | 3.89 |
| 4292+96 | I-3C | 233.00 | 0.90 | 0.18 | 2.58 | 1.80 | 10.00 | 0.0150 | 0.0400 | 0.0160 | 8.00 | 0.0400 | 4.94 | 0.78 | 0.09 | 0.87 | 0.161 | 4.02 |

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 02/27/2019 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :**NB SR 8 tSta. 4292+34 to 4297+62 Right **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 10.00 **Allowable Depth (ft.)** 0.25

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | RUNOFF AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4297+62 | Begin | | | | | | | | | | | | | | | | | |
| 4294+50 | CB-3 | 312.00 | 0.77 | 0.79 | 5.68 | 1.83 | 10.00 | 0.0150 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 4.94 | 2.17 | 0.83 | 3.01 | 0.256 | 6.39 |
| 4292+34 | CB-3 | 216.00 | 0.77 | 0.53 | 5.68 | 1.29 | 10.00 | 0.0150 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 4.94 | 2.09 | 0.76 | 2.85 | 0.251 | 6.26 |

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 02/28/2019 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :**SB SR 8 Sta. 4297+62to 4312+14 Right (Along median barrier) **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 8.00 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | RUNOFF AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4297+62 | Begin | | | | | | | | | | | | | | | | | |
| 4302+34 | I-3C | 472.00 | 0.90 | 0.49 | 2.58 | 2.41 | 10.00 | 0.0250 | 0.0400 | 0.0160 | 8.00 | 0.0400 | 4.94 | 1.38 | 0.80 | 2.18 | 0.206 | 5.15 |
| 4307+12 | I-3C | 478.00 | 0.90 | 0.44 | 2.58 | 2.33 | 10.00 | 0.0250 | 0.0400 | 0.0160 | 8.00 | 0.0400 | 4.94 | 1.61 | 1.15 | 2.76 | 0.225 | 5.62 |
| 4309+27 | I-3C | 215.00 | 0.90 | 0.12 | 2.58 | 1.21 | 10.00 | 0.0250 | 0.0400 | 0.0160 | 8.00 | 0.0400 | 4.94 | 1.16 | 0.53 | 1.69 | 0.187 | 4.68 |
| 4312+14 | I-3C | 287.00 | 0.90 | 0.14 | 2.58 | 2.07 | 10.00 | 0.0160 | 0.0400 | 0.0160 | 8.00 | 0.0400 | 4.94 | 0.95 | 0.20 | 1.15 | 0.176 | 4.40 |

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 02/28/2019 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :**NB SR 8 Sta. 4305+95 to 4312+14 Right **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 10.00 **Allowable Depth (ft.)** 0.25

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | RUNOFF AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4305+95 | Begin | | | | | | | | | | | | | | | | | |
| 4309+12 | CB-3A | 317.00 | 0.90 | 0.21 | 2.58 | 1.99 | 10.00 | 0.0250 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 4.94 | 0.79 | 0.14 | 0.93 | 0.150 | 3.75 |
| 4312+14 | CB-3A | 302.00 | 0.80 | 0.35 | 2.58 | 1.99 | 10.00 | 0.0160 | 0.0400 | 0.0160 | 12.00 | 0.0400 | 4.94 | 1.13 | 0.39 | 1.53 | 0.196 | 4.89 |

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 03/08/2019 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :** SR 8 SB Sta. 4308+96 to 4312+14 Left **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 10.00 **Allowable Depth (ft.)** 0.25

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4308+96 | Begin | | | | | | | | | | | | | | | | | |
| 4312+14 | CB-3A | 318.00 | 0.82 | 0.35 | 2.50 | 1.79 | 10.00 | 0.0250 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 4.94 | 1.09 | 0.32 | 1.42 | 0.175 | 4.38 |

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 02/27/2019 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :** NB SR 8 to Ramp T to EB 76 Right **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 10.00 **Allowable Depth (ft.)** 0.25

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4297+62 | Begin | | | | | | | | | | | | | | | | | | |
| 4301+00 | CB-3 | 338.00 | 0.77 | 0.90 | 5.93 | 1.59 | 10.00 | 0.0250 | 0.0400 | 0.0170 | 10.00 | 0.0400 | 4.94 | 2.40 | 1.03 | 3.43 | 0.244 | 6.10 | |
| 4302+33 | CB-3 | 133.00 | 0.77 | 0.35 | 6.13 | 0.69 | 10.00 | 0.0250 | 0.0400 | 0.0170 | 10.00 | 0.0400 | 4.94 | 1.82 | 0.54 | 2.36 | 0.212 | 5.30 | |
| 4305+25 | CB-3 | 292.00 | 0.90 | 0.73 | 4.75 | 1.32 | 10.00 | 0.0250 | 0.0400 | 0.0410 | 10.00 | 0.0400 | 4.94 | 2.58 | 1.21 | 3.78 | 0.253 | 6.33 | |
| 4307+00 | CB-3 | 175.00 | 0.80 | 0.34 | 5.51 | 0.89 | 10.00 | 0.0250 | 0.0400 | 0.0410 | 10.00 | 0.0400 | 4.94 | 1.93 | 0.62 | 2.55 | 0.218 | 5.46 | |
| 7308+25 | CB-3 | 132.00 | 0.82 | 0.19 | 2.08 | 1.29 | 10.00 | 0.0056 | 0.0460 | 0.0460 | 10.00 | 0.0400 | 4.94 | 1.27 | 0.12 | 1.39 | 0.242 | 5.27 | |
| 7308+95 | CB-3 | 70.00 | 0.82 | 0.14 | 4.75 | 0.93 | 10.00 | 0.0040 | 0.0460 | 0.0460 | 10.00 | 0.0400 | 4.94 | ****** | ****** | 0.68 | 0.198 | 4.31 | Sag |
| 560+75 | Begin | | | | | | | | | | | | | | | | | | |
| 555+50 | I-3D | 525.00 | 0.90 | 0.63 | 2.58 | 3.05 | 10.00 | 0.0152 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 4.94 | 1.79 | 1.01 | 2.80 | 0.248 | 6.21 | |
| 550+50 | I-3D | 500.00 | 0.90 | 0.44 | 2.58 | 2.77 | 10.00 | 0.0172 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 4.94 | 1.82 | 1.16 | 2.97 | 0.248 | 6.20 | |
| 7320+49 | I-3D | 574.00 | 0.90 | 0.53 | 2.58 | 2.25 | 10.00 | 0.0381 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 4.94 | 1.71 | 1.80 | 3.52 | 0.228 | 5.69 | |
| 7317+75 | CB-3 | 274.00 | 0.79 | 0.26 | 2.58 | 1.13 | 10.00 | 0.0400 | 0.0400 | 0.0160 | 6.00 | 0.0400 | 4.94 | 2.10 | 0.71 | 2.82 | 0.207 | 5.19 | |
| 7316+08 | CB-3 | 167.00 | 0.79 | 0.28 | 2.15 | 0.75 | 10.00 | 0.0400 | 0.0400 | 0.0390 | 6.00 | 0.0400 | 4.94 | 1.50 | 0.31 | 1.81 | 0.176 | 4.39 | |
| 7312+98 | CB-3 | 310.00 | 0.79 | 0.48 | 1.98 | 1.42 | 10.00 | 0.0322 | 0.0400 | 0.0390 | 6.00 | 0.0400 | 4.94 | 1.73 | 0.45 | 2.18 | 0.196 | 4.91 | |
| 7310+75 | CB-3 | 223.00 | 0.78 | 0.42 | 5.41 | 1.41 | 10.00 | 0.0144 | 0.0460 | 0.0460 | 10.00 | 0.0400 | 4.94 | 1.73 | 0.35 | 2.07 | 0.236 | 5.13 | |
| 7309+65 | CB-3 | 110.00 | 0.78 | 0.29 | 2.08 | 1.04 | 10.00 | 0.0056 | 0.0460 | 0.0460 | 10.00 | 0.0400 | 4.94 | 1.33 | 0.14 | 1.46 | 0.247 | 5.38 | |

# INLET SPACING DESIGN

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | RUNOFF AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7308+95 | CB-3 | 70.00 | 0.78 | 0.17 | 2.08 | 0.87 | 10.00 | 0.0040 | 0.0460 | 0.0460 | 10.00 | 0.0400 | 4.94 | ****** | ****** | 0.79 | 0.209 | 4.55 | End |

**SUMP DATA**

**Total Flow (cfs) :** 1.48

**Ponded Depth (ft.) :** 0.125

**Spread on Pavement (ft.) :** 3.24

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 02/27/2019 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :**NB SR 8 to Ramp T to EB 76 Right **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 50 **Total Allow. Spread (ft.) :** 10.00 **Allowable Depth (ft.)** 0.25

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | RUNOFF AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4297+62 | Begin | | | | | | | | | | | | | | | | | | |
| 4301+00 | CB-3 | 338.00 | 0.77 | 0.90 | 5.93 | 1.50 | 10.00 | 0.0250 | 0.0400 | 0.0170 | 10.00 | 0.0400 | 6.13 | 2.80 | 1.45 | 4.25 | 0.264 | 6.61 | |
| 4302+33 | CB-3 | 133.00 | 0.77 | 0.35 | 6.13 | 0.65 | 10.00 | 0.0250 | 0.0400 | 0.0170 | 10.00 | 0.0400 | 6.13 | 2.23 | 0.87 | 3.10 | 0.235 | 5.87 | |
| 4305+25 | CB-3 | 292.00 | 0.90 | 0.73 | 4.75 | 1.24 | 10.00 | 0.0250 | 0.0400 | 0.0410 | 10.00 | 0.0400 | 6.13 | 3.10 | 1.80 | 4.90 | 0.279 | 6.97 | |
| 4307+00 | CB-3 | 175.00 | 0.80 | 0.34 | 5.51 | 0.83 | 10.00 | 0.0250 | 0.0400 | 0.0410 | 10.00 | 0.0400 | 6.13 | 2.42 | 1.05 | 3.47 | 0.245 | 6.13 | |
| 7308+25 | CB-3 | 132.00 | 0.82 | 0.19 | 2.08 | 1.18 | 10.00 | 0.0056 | 0.0460 | 0.0460 | 10.00 | 0.0400 | 6.13 | 1.71 | 0.30 | 2.00 | 0.278 | 6.05 | |
| 7308+95 | CB-3 | 70.00 | 0.82 | 0.14 | 4.75 | 0.85 | 10.00 | 0.0040 | 0.0460 | 0.0460 | 10.00 | 0.0400 | 6.13 | ****** | ****** | 1.00 | 0.229 | 4.97 | Sag |
| 560+75 | Begin | | | | | | | | | | | | | | | | | | |
| 555+50 | I-3D | 525.00 | 0.90 | 0.63 | 2.58 | 2.90 | 10.00 | 0.0152 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 6.13 | 2.06 | 1.42 | 3.48 | 0.269 | 6.73 | |
| 550+50 | I-3D | 500.00 | 0.90 | 0.44 | 2.58 | 2.61 | 10.00 | 0.0172 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 6.13 | 2.15 | 1.70 | 3.84 | 0.273 | 6.83 | |
| 7320+49 | I-3D | 574.00 | 0.90 | 0.53 | 2.58 | 2.11 | 10.00 | 0.0381 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 6.13 | 2.03 | 2.59 | 4.62 | 0.252 | 6.30 | |
| 7317+75 | CB-3 | 274.00 | 0.79 | 0.26 | 2.58 | 1.05 | 10.00 | 0.0400 | 0.0400 | 0.0160 | 6.00 | 0.0400 | 6.13 | 2.64 | 1.21 | 3.85 | 0.233 | 5.83 | |
| 7316+08 | CB-3 | 167.00 | 0.79 | 0.28 | 2.15 | 0.69 | 10.00 | 0.0400 | 0.0400 | 0.0390 | 6.00 | 0.0400 | 6.13 | 1.96 | 0.61 | 2.57 | 0.200 | 5.01 | |
| 7312+98 | CB-3 | 310.00 | 0.79 | 0.48 | 1.98 | 1.33 | 10.00 | 0.0322 | 0.0400 | 0.0390 | 6.00 | 0.0400 | 6.13 | 2.15 | 0.78 | 2.93 | 0.219 | 5.48 | |
| 7310+75 | CB-3 | 223.00 | 0.78 | 0.42 | 5.41 | 1.31 | 10.00 | 0.0144 | 0.0460 | 0.0460 | 10.00 | 0.0400 | 6.13 | 2.16 | 0.62 | 2.79 | 0.264 | 5.74 | |
| 7309+65 | CB-3 | 110.00 | 0.78 | 0.29 | 2.08 | 0.97 | 10.00 | 0.0056 | 0.0460 | 0.0460 | 10.00 | 0.0400 | 6.13 | 1.71 | 0.30 | 2.01 | 0.279 | 6.06 | |

# INLET SPACING DESIGN

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | RUNOFF AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7308+95 | CB-3 | 70.00 | 0.78 | 0.17 | 2.08 | 0.81 | 10.00 | 0.0040 | 0.0460 | 0.0460 | 10.00 | 0.0400 | 6.13 | ****** | ****** | 1.11 | 0.238 | 5.17 | End |

**SUMP DATA**

**Total Flow (cfs) :** 2.12

**Ponded Depth (ft.) :** 0.169

**Spread on Pavement (ft.) :** 4.20

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 03/04/2019 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :** Ramp N 3325+25 to 3328+80 Lt, Sag Under Heritage Trail **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 4.00 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3325+25 | Begin | | | | | | | | | | | | | | | | | | |
| 3326+27 | I-3D | 102.00 | 0.90 | 0.06 | 2.31 | 1.23 | 10.00 | 0.0096 | 0.0400 | 0.0160 | 4.00 | 0.0400 | 4.94 | ****** | ****** | 0.27 | 0.112 | 2.80 | Sag |
| 3328+80 | Begin | | | | | | | | | | | | | | | | | | |
| 3326+75 | I-3D | 205.00 | 0.90 | 0.15 | 2.22 | 2.19 | 10.00 | 0.0089 | 0.0400 | 0.0160 | 4.00 | 0.0400 | 4.94 | 0.66 | 0.01 | 0.67 | 0.160 | 4.02 | |
| 3326+27 | I-3D | 48.00 | 0.90 | 0.03 | 2.31 | 0.69 | 10.00 | 0.0089 | 0.0400 | 0.0160 | 4.00 | 0.0400 | 4.94 | ****** | ****** | 0.15 | 0.090 | 2.26 | End |

**SUMP DATA**

**Total Flow (cfs) :** 0.41 **Ponded Depth (ft.) :** 0.056 **Spread on Pavement (ft.) :** 1.13

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 03/04/2019 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :** Ramp N 3325+25 to 3328+80 Lt, Sag Under Heritage Trail **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 50 **Total Allow. Spread (ft.) :** 4.00 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3325+25 | Begin | | | | | | | | | | | | | | | | | | |
| 3326+27 | I-3D | 102.00 | 0.90 | 0.06 | 2.31 | 1.17 | 10.00 | 0.0096 | 0.0400 | 0.0160 | 4.00 | 0.0400 | 6.13 | ****** | ****** | 0.33 | 0.122 | 3.04 | Sag |
| 3328+80 | Begin | | | | | | | | | | | | | | | | | | |
| 3326+75 | I-3D | 205.00 | 0.90 | 0.15 | 2.22 | 2.09 | 10.00 | 0.0089 | 0.0400 | 0.0160 | 4.00 | 0.0400 | 6.13 | 0.79 | 0.04 | 0.83 | 0.174 | 4.86 | |
| 3326+27 | I-3D | 48.00 | 0.90 | 0.03 | 2.31 | 0.64 | 10.00 | 0.0089 | 0.0400 | 0.0160 | 4.00 | 0.0400 | 6.13 | ****** | ****** | 0.21 | 0.103 | 2.58 | End |

**SUMP DATA**

**Total Flow (cfs) :** 0.54 **Ponded Depth (ft.) :** 0.067 **Spread on Pavement (ft.) :** 1.34

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 11/21/2017 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :** Ramp N 3337+50 to 3332+15 LT **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 4.00 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | RUNOFF AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3337+50 | Begin | | | | | | | | | | | | | | | | | |
| 3332+15 | CB-3A | 535.00 | 0.90 | 0.07 | 1.11 | 2.93 | 10.00 | 0.0700 | 0.0400 | 0.0600 | 4.00 | 0.0400 | 5.10 | 0.32 | 0.00 | 0.32 | 0.083 | 2.07 |

C.B. not added, use Slume since < 0.75 cfs

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 11/21/2017 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :** Ramp N 3337+50 to 3332+15 RT **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 10.00 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3337+50 | Begin | | | | | | | | | | | | | | | | | |
| 3332+15 | CB-3A | 535.00 | 0.90 | 0.34 | 2.03 | 1.78 | 10.00 | 0.0700 | 0.0600 | 0.0600 | 10.00 | 0.0400 | 5.10 | 1.41 | 0.15 | 1.56 | 0.174 | 2.90 |

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 12/05/2017 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :** Ramp N 3337+50 to 3340+75 LT **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 4.00 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3337+50 | Begin | | | | | | | | | | | | | | | | | | |
| 3344+25 | I-3D | 675.00 | 0.90 | 0.12 | 2.20 | 8.30 | 10.51 | 0.0072 | 0.0400 | 0.0250 | 4.00 | 0.0400 | 4.85 | 0.52 | 0.00 | 0.52 | 0.152 | 3.81 | |
| 3344+73 | I-3D | 48.00 | 0.90 | 0.02 | 2.20 | 0.84 | 10.00 | 0.0072 | 0.0400 | 0.0250 | 4.00 | 0.0400 | 4.94 | ****** | ****** | 0.09 | 0.078 | 1.96 | Sag |
| 3346+60 | Begin | | | | | | | | | | | | | | | | | | |
| 3345+25 | I-3D | 135.00 | 0.90 | 0.06 | 2.20 | 1.78 | 10.00 | 0.0078 | 0.0400 | 0.0250 | 4.00 | 0.0400 | 4.94 | 0.27 | 0.00 | 0.27 | 0.117 | 2.91 | |
| 3344+73 | I-3D | 52.00 | 0.90 | 0.02 | 2.20 | 0.89 | 10.00 | 0.0078 | 0.0400 | 0.0250 | 4.00 | 0.0000 | 4.94 | ****** | ****** | 0.09 | 0.077 | 1.93 | End |

## SUMP DATA

**Total Flow (cfs) :** 0.18 **Ponded Depth (ft.) :** 0.032 **Spread on Pavement (ft.) :** 0.80

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 12/05/2017 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :** Ramp N 3337+50 to 3340+75 LT **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 50 **Total Allow. Spread (ft.) :** 4.00 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3337+50 | Begin | | | | | | | | | | | | | | | | | | |
| 3344+25 | I-3D | 675.00 | 0.90 | 0.12 | 2.20 | 7.84 | 10.04 | 0.0072 | 0.0400 | 0.0250 | 4.00 | 0.0400 | 6.12 | 0.66 | 0.00 | 0.66 | 0.166 | 4.25 | |
| 3344+73 | I-3D | 48.00 | 0.90 | 0.02 | 2.20 | 0.80 | 10.00 | 0.0072 | 0.0400 | 0.0250 | 4.00 | 0.0400 | 6.13 | ****** | ****** | 0.11 | 0.086 | 2.15 | Sag |
| 3346+60 | Begin | | | | | | | | | | | | | | | | | | |
| 3345+25 | I-3D | 135.00 | 0.90 | 0.06 | 2.20 | 1.69 | 10.00 | 0.0078 | 0.0400 | 0.0250 | 4.00 | 0.0400 | 6.13 | 0.33 | 0.00 | 0.33 | 0.126 | 3.16 | |
| 3344+73 | I-3D | 52.00 | 0.90 | 0.02 | 2.20 | 0.85 | 10.00 | 0.0078 | 0.0400 | 0.0250 | 4.00 | 0.0000 | 6.13 | ****** | ****** | 0.11 | 0.084 | 2.09 | End |

## SUMP DATA

**Total Flow (cfs) :** 0.22 **Ponded Depth (ft.) :** 0.037 **Spread on Pavement (ft.) :** 0.94

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 11/17/2017 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :** Ramp N 3337+50 to 3339+410 RT **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 4.00 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | RUNOFF AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3337+50 | Begin | | | | | | | | | | | | | | | | | |
| 3339+10 | CB-3A | 160.00 | 0.90 | 0.10 | 2.03 | 1.05 | 10.00 | 0.0250 | 0.0600 | 0.0600 | 10.00 | 0.0400 | 5.10 | 0.46 | 0.00 | 0.46 | 0.134 | 2.23 |

~~C.B. not added, use flume since < 0.75 cfs~~

Since MSE walls proposed C.B. added

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 03/08/2019 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :** Ramp O Sta. 8319+94 to 8317+00 Left **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 13.00 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | RUNOFF AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8319+94 | Begin | | | | | | | | | | | | | | | | | |
| 8317+00 | CB-3A | 294.00 | 0.90 | 0.20 | 2.43 | 3.32 | 10.00 | 0.0056 | 0.0400 | 0.0160 | 13.00 | 0.0400 | 4.94 | 0.74 | 0.15 | 0.89 | 0.195 | 4.87 |

RT side shoulder is 7.5' with 1/3 the area ∴ spread work, no C.B. reqd.

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 02/04/2019 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :** Ramp R 2523+50 to I-76 507+50 **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 8.50 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | RUNOFF AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2534+00 | Begin | | | | | | | | | | | | | | | | | |
| 2524+95 | I-3D | 905.00 | 0.90 | 0.44 | 1.84 | 3.68 | 10.00 | 0.0500 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 4.94 | 1.12 | 0.84 | 1.96 | 0.174 | 4.34 |
| 2523+80 | I-3C | 115.00 | 0.90 | 0.03 | 1.84 | 0.58 | 10.00 | 0.0500 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 4.94 | 0.71 | 0.26 | 0.97 | 0.133 | 3.34 |
| 2521+30 | I-3C | 250.00 | 0.90 | 0.07 | 1.55 | 1.38 | 10.00 | 0.0500 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 4.94 | 0.49 | 0.08 | 0.57 | 0.110 | 2.74 |
| 2518+87 | I-3C | 243.00 | 0.90 | 0.10 | 1.49 | 1.34 | 10.00 | 0.0500 | 0.0400 | 0.0160 | 9.00 | 0.0400 | 4.94 | 0.46 | 0.07 | 0.53 | 0.106 | 2.66 |
| 512+57 | I-3C | 530.00 | 0.90 | 0.34 | 1.46 | 3.25 | 10.00 | 0.0189 | 0.0400 | 0.0160 | 8.50 | 0.0400 | 4.94 | 1.16 | 0.42 | 1.58 | 0.192 | 4.81 |
| 507+50 | I-3C | 500.00 | 0.90 | 0.39 | 1.46 | 2.85 | 10.00 | 0.0189 | 0.0400 | 0.0160 | 8.50 | 0.0400 | 4.94 | 1.44 | 0.71 | 2.15 | 0.216 | 5.40 |

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 02/04/2019 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :** Ramp R 2525+50 to 2534+00 RT **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 4.00 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2534+00 | Begin | | | | | | | | | | | | | | | | | |
| 2525+50 | CB-3A | 850.00 | 0.90 | 0.22 | 1.84 | 4.13 | 10.00 | 0.0500 | 0.0400 | 0.0160 | 4.00 | 0.0400 | 4.94 | 0.85 | 0.13 | 0.98 | 0.134 | 3.35 |

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 11/17/2017 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :**Ramp R 2534+00 to 2542+50 LT **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 10.00 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2534+00 | Begin | | | | | | | | | | | | | | | | | |
| 2542+50 | I-3D | 850.00 | 0.90 | 0.54 | 2.00 | 2.83 | 10.00 | 0.0700 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 5.10 | 1.21 | 1.26 | 2.48 | 0.178 | 4.45 |

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 11/17/2017 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :** Ramp R 2534+00 to 2540+50 RT **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 4.00 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | RUNOFF AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2534+00 | Begin | | | | | | | | | | | | | | | | | |
| 2540+50 | CB-3A | 650.00 | 0.90 | 0.08 | 1.11 | 3.48 | 10.00 | 0.0700 | 0.0400 | 0.0160 | 4.00 | 0.0400 | 5.10 | 0.37 | 0.00 | 0.37 | 0.087 | 2.17 |

No C.B. added, use flume since <0.75

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 02/28/2019 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :**Ramp T Sta. 7305+90 to 7310+69 Left (Along face of barrier) **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 10.00 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7305+90 | Begin | | | | | | | | | | | | | | | | | | |
| 7308+95 | I-3D | 305.00 | 0.90 | 0.08 | 1.55 | 4.96 | 10.00 | 0.0040 | 0.0400 | 0.0460 | 10.00 | 0.0400 | 4.94 | ****** | ****** | 0.36 | 0.147 | 3.68 | Sag |
| 7310+69 | Begin | | | | | | | | | | | | | | | | | | |
| 7308+95 | I-3D | 174.00 | 0.90 | 0.05 | 1.55 | 3.11 | 10.00 | 0.0040 | 0.0400 | 0.0460 | 10.00 | 0.0400 | 4.94 | ****** | ****** | 0.22 | 0.123 | 3.08 | End |

**SUMP DATA**

**Total Flow (cfs) :** 0.58 **Ponded Depth (ft.) :** 0.071 **Spread on Pavement (ft.) :** 1.60

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 02/28/2019 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :**Ramp T Sta. 7305+90 to 7310+69 Left (Along face of barrier) **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 50 **Total Allow. Spread (ft.) :** 10.00 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7305+90 | Begin | | | | | | | | | | | | | | | | | | |
| 7308+95 | I-3D | 305.00 | 0.90 | 0.08 | 1.55 | 4.69 | 10.00 | 0.0040 | 0.0400 | 0.0460 | 10.00 | 0.0400 | 6.13 | ****** | ****** | 0.44 | 0.159 | 3.99 | Sag |
| 7310+69 | Begin | | | | | | | | | | | | | | | | | | |
| 7308+95 | I-3D | 174.00 | 0.90 | 0.05 | 1.55 | 2.95 | 10.00 | 0.0040 | 0.0400 | 0.0460 | 10.00 | 0.0400 | 6.13 | ****** | ****** | 0.28 | 0.134 | 3.34 | End |

**SUMP DATA**

**Total Flow (cfs) :** 0.72 **Ponded Depth (ft.) :** 0.081 **Spread on Pavement (ft.) :** 1.85

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 11/30/2017 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :** Lane U 4536+00 To Ramp R 2548+00; Sag Under Johnson **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 10 **Total Allow. Spread (ft.) :** 10.00 **Allowable Depth (ft.)** 0.50

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | RUNOFF AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4536+00 | Begin | | | | | | | | | | | | | | | | | | |
| 4534+80 | I-3D | 120.00 | 0.78 | 0.23 | 5.61 | 0.60 | 10.00 | 0.0475 | 0.0400 | 0.0400 | 10.00 | 0.0400 | 5.10 | 0.68 | 0.23 | 0.91 | 0.132 | 3.29 | |
| 4533+64 | I-3D | 116.00 | 0.78 | 0.11 | 5.61 | 1.64 | 10.00 | 0.0040 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 5.10 | ****** | ****** | 0.67 | 0.186 | 4.65 | Sag |
| 2548+00 | Begin | | | | | | | | | | | | | | | | | | |
| 2545+67 | I-3D | 233.00 | 0.84 | 0.57 | 2.98 | 1.30 | 10.00 | 0.0175 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 5.10 | 1.59 | 0.85 | 2.44 | 0.230 | 5.74 | |
| 4534+80 | I-3D | 90.00 | 0.84 | 0.16 | 2.98 | 1.02 | 10.00 | 0.0040 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 5.10 | ****** | ****** | 1.54 | 0.255 | 6.37 | End |

**SUMP DATA**

**Total Flow (cfs) :** 2.20 **Ponded Depth (ft.) :** 0.172 **Spread on Pavement (ft.) :** 3.91

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 11/30/2017 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :** Lane U 4536+00 To Ramp R 2548+00; Sag Under Johnson **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 50 **Total Allow. Spread (ft.) :** 10.00 **Allowable Depth (ft.)** 0.50

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | RUNOFF AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4536+00 | Begin | | | | | | | | | | | | | | | | | | |
| 4534+80 | I-3D | 120.00 | 0.78 | 0.23 | 5.61 | 0.56 | 10.00 | 0.0475 | 0.0400 | 0.0400 | 10.00 | 0.0400 | 6.79 | 0.83 | 0.39 | 1.22 | 0.147 | 3.67 | |
| 4533+64 | I-3D | 116.00 | 0.78 | 0.11 | 5.61 | 1.49 | 10.00 | 0.0040 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 6.79 | ****** | ****** | 0.97 | 0.214 | 5.36 | Sag |
| 2548+00 | Begin | | | | | | | | | | | | | | | | | | |
| 2545+67 | I-3D | 233.00 | 0.84 | 0.57 | 2.98 | 1.19 | 10.00 | 0.0175 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 6.79 | 1.92 | 1.33 | 3.25 | 0.256 | 6.39 | |
| 4534+80 | I-3D | 90.00 | 0.84 | 0.16 | 2.98 | 0.92 | 10.00 | 0.0040 | 0.0400 | 0.0160 | 10.00 | 0.0400 | 6.79 | ****** | ****** | 2.25 | 0.294 | 7.34 | End |

**SUMP DATA**

**Total Flow (cfs) :** 3.22 **Ponded Depth (ft.) :** 0.221 **Spread on Pavement (ft.) :** 5.03

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 11/30/2017 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :**South Street; East end of Cul-De-Sac to Ex. CB at 22+08 **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 2 **Total Allow. Spread (ft.) :** 8.00 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25+30 | Begin | | | | | | | | | | | | | | | | | |
| 22+08 | CB-3A | 322.00 | 0.73 | 0.61 | 6.67 | 2.30 | 10.00 | 0.0160 | 0.0833 | 0.0160 | 2.00 | 0.0400 | 3.60 | 1.30 | 0.31 | 1.60 | 0.245 | 6.91 |

# INLET SPACING DESIGN

**PID :** 101402 **Date :** 11/17/2017 **Project :** SUM-72/77-11.30/11.31 **Location :** Akron, Central Interchange

**Description :** Heritage Trail Flow/Spread Check on Flater Side **Designer :** KEH

**Rainfall Area:** A **Storm Frequency (yr.) :** 2 **Total Allow. Spread (ft.) :** 6.00 **Allowable Depth (ft.)** 0.42

| STATION | C.B. Type | GUTTER LENGTH (ft.) | RUNOFF COEF | AREA (acres) | CONC. TIME (min.) | GUTTER TIME (min.) | TIME USED (min.) | LONG. SLOPE (ft./ft.) | GUTT. SLOPE (ft./ft.) | PAVT. SLOPE (ft./ft.) | GUTT. WIDTH (ft.) | LOCAL DEPRESS. (ft.) | RAIN FALL (in./hrs.) | INTERCPTD FLOW (cfs.) | BYPASS FLOW (cfs.) | TOTAL FLOW (cfs.) | DEPTH FLOW (ft.) | PAVT. SPREAD (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11+50 | Begin | | | | | | | | | | | | | | | | | |
| 10+00 | CB-3A | 150.00 | 0.90 | 0.11 | 1.48 | 1.45 | 10.00 | 0.0250 | 0.0160 | 0.0160 | 0.00 | 0.0400 | 3.60 | 0.28 | 0.08 | 0.36 | 0.074 | 4.63 |

# DITCH ANALYSIS

**PID :** 101402 **Date :** 04/08/2019 **Project :** SUM-76/77 Central Int **Location :** EB I-76

**Description :**507+25 to 510+00

**Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| | **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| | **RCP** | **Type B:** | 6.00 | | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 510+00 | 509+00 | R | 100.00 | 2.00 | 3.00 | 3.00 | 0.0189 | 0.16 | 0.16 | 0.64 | 0.10 | Seed | 3.93 | 5 | 0.030 | 12.91 | 1.45 | 0.14 | 0.40 | 0.12 | 2.71 |
| | | | | | | | | | | | | Seed | 4.40 | 10 | 0.040 | 13.10 | 1.28 | 0.17 | 0.45 | 0.15 | 2.87 |
| 509+00 | 508+00 | R | 100.00 | 2.00 | 3.00 | 3.00 | 0.0190 | 0.10 | 0.26 | 0.64 | 0.17 | Seed | 3.80 | 5 | 0.030 | 13.86 | 1.71 | 0.18 | 0.63 | 0.15 | 2.90 |
| | | | | | | | | | | | | Seed | 4.23 | 10 | 0.040 | 14.24 | 1.46 | 0.22 | 0.70 | 0.19 | 3.13 |
| 508+00 | 507+25 | R | 75.00 | 2.00 | 3.00 | 3.00 | 0.0196 | 0.11 | 0.37 | 0.64 | 0.24 | Seed | 3.71 | 5 | 0.030 | 14.51 | 1.92 | 0.22 | 0.88 | 0.18 | 3.08 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.00 | 1.62 | 0.28 | 0.98 | 0.23 | 3.35 |

Flow to Ex. Ditch from adjoining project

# DITCH ANALYSIS

**PID :** 101402 **Date :** 04/08/2019 **Project :** SUM-76/77 Central Int **Location :** EB I-76

**Description :** 521+00 to 521+50

**Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 521+00 | 521+50 | R | 50.00 | 2.00 | 2.00 | 2.00 | 0.0172 | 0.04 | 0.04 | 0.70 | 0.03 | Seed | 3.67 | 5 | 0.030 | 14.85 | 0.91 | 0.06 | 0.10 | 0.05 | 2.21 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.00 | 0.77 | 0.07 | 0.12 | 0.07 | 2.28 |

# DITCH ANALYSIS

**PID :** 101402 **Date :** 04/08/2019 **Project :** SUM-76/77 Central Int **Location :** EB I-76

**Description :** 522+00 to 521+50

**Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| | **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| | **RCP** | **Type B:** | 6.00 | | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 522+00 | 521+50 | R | 50.00 | 2.00 | 2.00 | 2.00 | 0.0024 | 0.06 | 0.06 | 0.70 | 0.04 | Seed | 3.68 | 5 | 0.030 | 14.79 | 0.56 | 0.02 | 0.15 | 0.12 | 2.49 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.00 | 0.46 | 0.02 | 0.17 | 0.16 | 2.64 |

# DITCH ANALYSIS

**PID :** 101402 **Date :** 12/08/2017 **Project :** SUM-76/77 Central Int **Location :** EB I-76

**Description :**518+50 to 520+00

**Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| **RCP** | | **Type B:** | 6.00 | | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 518+50 | 519+00 | R | 50.00 | 2.00 | 2.00 | 2.00 | 0.0032 | 0.06 | 0.06 | 0.70 | 0.04 | Seed | 3.87 | 5 | 0.030 | 13.34 | 0.61 | 0.02 | 0.16 | 0.12 | 2.47 |
| | | | | | | | | | | | | Seed | 4.33 | 10 | 0.040 | 13.55 | 0.53 | 0.03 | 0.18 | 0.15 | 2.60 |
| 519+00 | 520+00 | R | 100.00 | 2.00 | 2.00 | 2.00 | 0.0178 | 0.05 | 0.11 | 0.70 | 0.08 | Seed | 3.70 | 5 | 0.030 | 14.60 | 1.34 | 0.11 | 0.28 | 0.10 | 2.39 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.01 | 1.15 | 0.14 | 0.32 | 0.12 | 2.49 |

# DITCH ANALYSIS

**PID :** 101402 **Date :** 04/08/2019 **Project :** SUM-76/77 Central Int **Location :** EB I-76

**Description :**521+50 to 520+00

**Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| **RCP** | | **Type B:** | 6.00 | | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

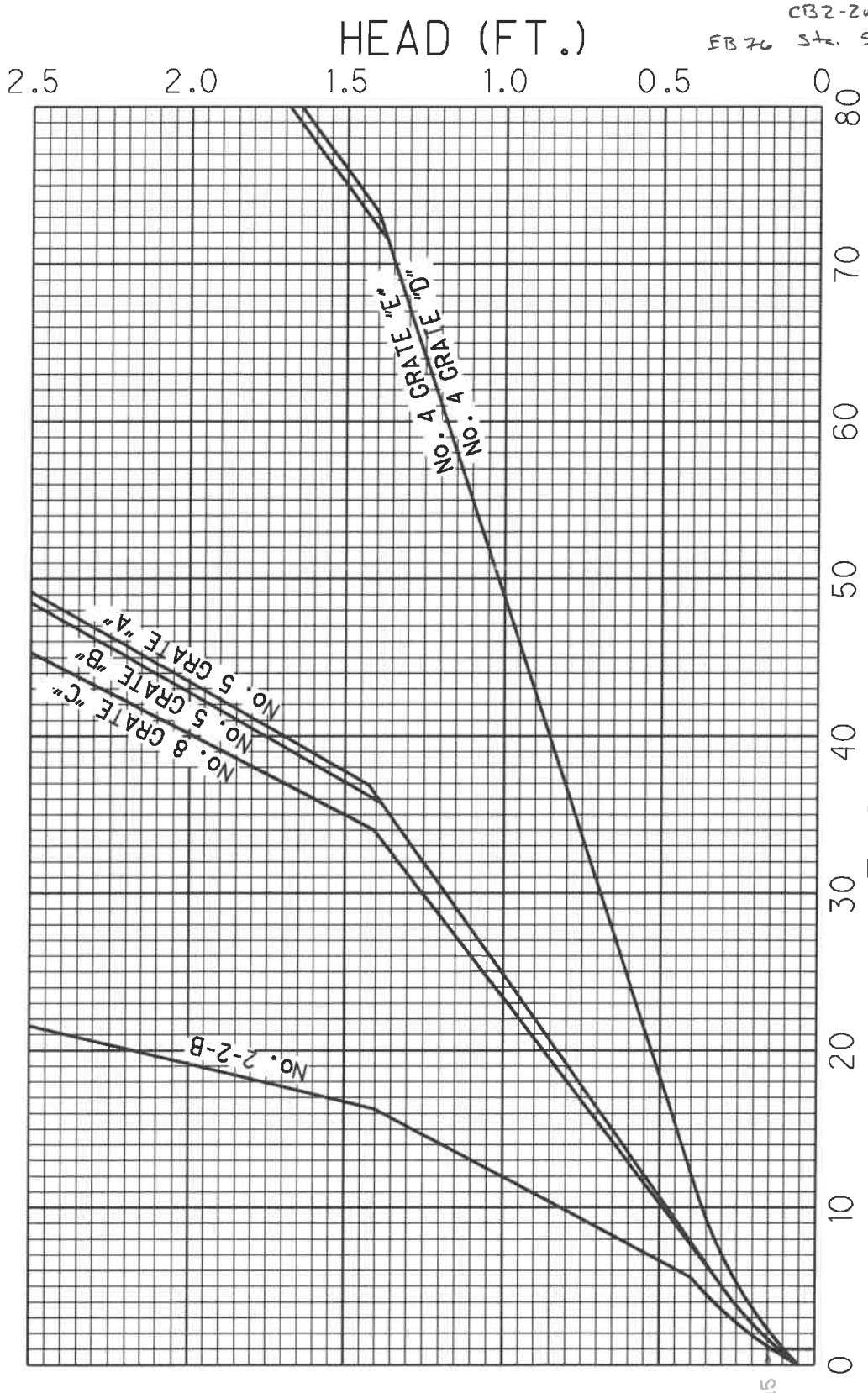
| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 521+00 | 520+00 | R | 100.00 | 2.00 | 2.00 | 2.00 | 0.0148 | 0.07 | 0.07 | 0.70 | 0.05 | Seed | 3.68 | 5 | 0.030 | 14.78 | 1.04 | 0.07 | 0.18 | 0.08 | 2.32 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.00 | 0.90 | 0.09 | 0.20 | 0.10 | 2.41 |

# CAPACITY OF A GRATE CATCH BASIN IN A SUMP

1102-1

**REFERENCE SECTION**
1102.3.5

EB 76 Sta. 520+00 RT
CB2-2A
EB 76 Sta. 521+50 RT
CB2-2A




Largest $Q_{100} = 0.32 + 0.20 = 0.52 \times 2 = 1.04$ => Depth = 0.15 ft < 0.5 ft

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

0.15

# DITCH ANALYSIS

**PID :** 101402 **Date :** 02/15/2019 **Project :** SUM-76/77 Central Int **Location :** EB I-76

**Description :**530+50 to to 525+00 Left

**Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

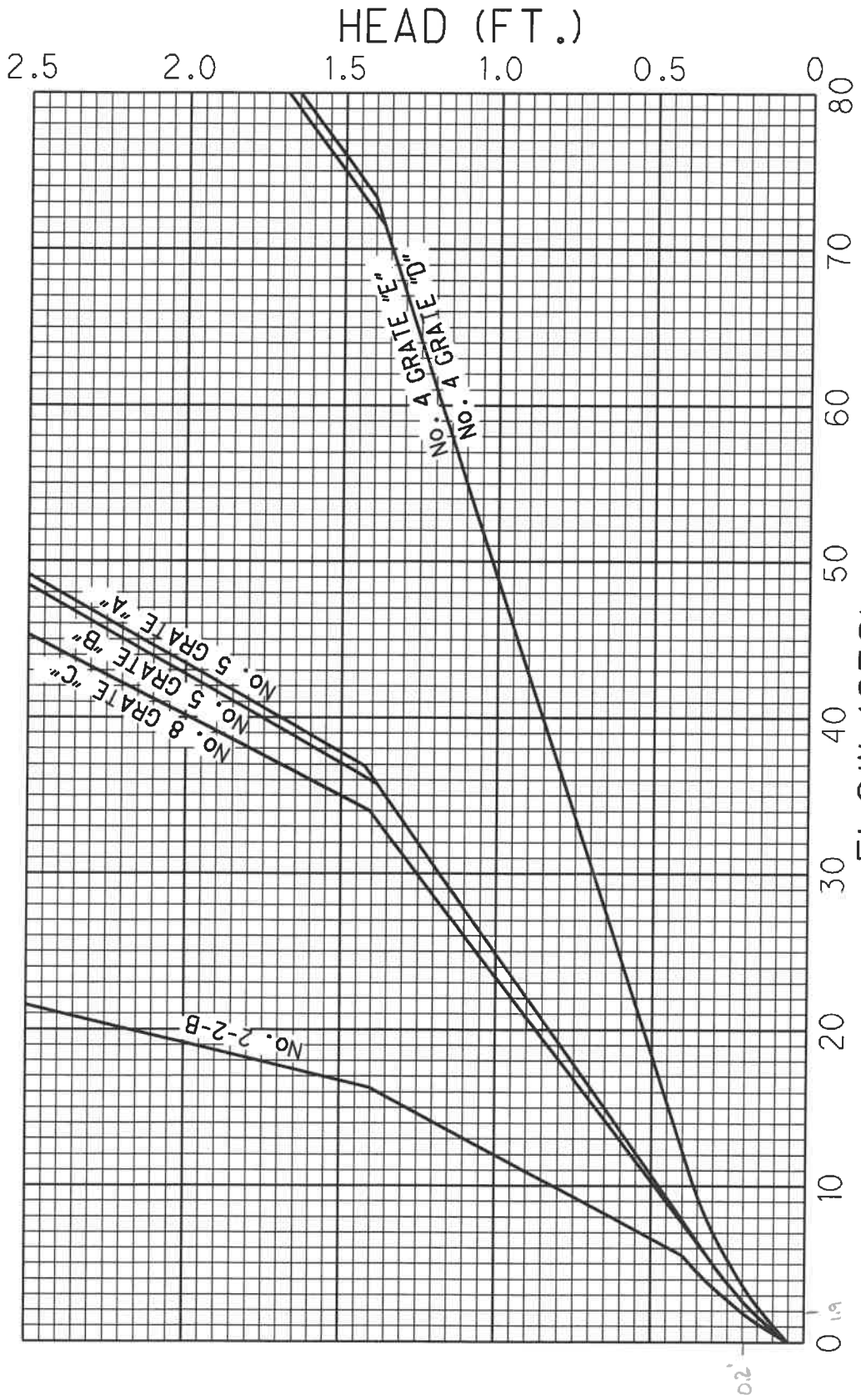
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| **RCP** | | **Type B:** | 6.00 | | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 530+50 | 529+50 | L | 100.00 | 2.00 | 2.00 | 2.00 | 0.0015 | 0.08 | 0.08 | 0.70 | 0.06 | Seed | 3.90 | 5 | 0.015 | 13.12 | 0.83 | 0.01 | 0.22 | 0.12 | 2.47 |
| | | | | | | | | | | | | Seed | 4.41 | 10 | 0.015 | 13.08 | 0.89 | 0.01 | 0.25 | 0.12 | 2.49 |
| 529+50 | 528+50 | L | 100.00 | 2.00 | 2.00 | 2.00 | 0.0101 | 0.08 | 0.16 | 0.70 | 0.11 | Seed | 3.79 | 5 | 0.015 | 13.95 | 2.00 | 0.06 | 0.42 | 0.10 | 2.39 |
| | | | | | | | | | | | | Seed | 4.29 | 10 | 0.015 | 13.88 | 2.07 | 0.07 | 0.48 | 0.10 | 2.42 |
| 528+50 | 527+50 | L | 100.00 | 2.00 | 2.00 | 2.00 | 0.0166 | 0.06 | 0.22 | 0.70 | 0.15 | Seed | 3.70 | 5 | 0.015 | 14.59 | 2.57 | 0.10 | 0.57 | 0.10 | 2.40 |
| | | | | | | | | | | | | Seed | 4.20 | 10 | 0.015 | 14.50 | 2.68 | 0.11 | 0.65 | 0.11 | 2.44 |
| 527+50 | 526+50 | L | 100.00 | 2.00 | 2.00 | 2.00 | 0.0226 | 0.05 | 0.27 | 0.70 | 0.19 | Seed | 3.63 | 5 | 0.015 | 15.14 | 3.05 | 0.14 | 0.69 | 0.10 | 2.41 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.015 | 15.02 | 3.19 | 0.16 | 0.78 | 0.11 | 2.44 |
| 526+50 | 525+50 | L | 100.00 | 2.00 | 2.00 | 2.00 | 0.0250 | 0.05 | 0.32 | 0.70 | 0.22 | Seed | 3.57 | 5 | 0.015 | 15.64 | 3.32 | 0.17 | 0.80 | 0.11 | 2.44 |
| | | | | | | | | | | | | Seed | 4.06 | 10 | 0.015 | 15.50 | 3.45 | 0.18 | 0.91 | 0.12 | 2.47 |
| 525+50 | 525+00 | L | 50.00 | 2.00 | 2.00 | 2.00 | 0.0630 | 0.01 | 0.33 | 0.70 | 0.23 | Seed | 3.55 | 5 | 0.015 | 15.82 | 4.47 | 0.33 | 0.82 | 0.08 | 2.34 |
| | | | | | | | | | | | | Seed | 4.04 | 10 | 0.015 | 15.67 | 4.68 | 0.36 | 0.93 | 0.09 | 2.37 |

| CAPACITY OF A GRATE CATCH BASIN IN A SUMP | 1102-1 |
|---|---|
| | **REFERENCE SECTION** 1102.3.5 |

76 EB Sta 525+00 LT




CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

# DITCH ANALYSIS

**PID :** 101402 **Date :** 03/06/2019 **Project :** SUM-76/77 Central Int **Location :** EB I-76

**Description :**528+75 to 526+75 Right **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

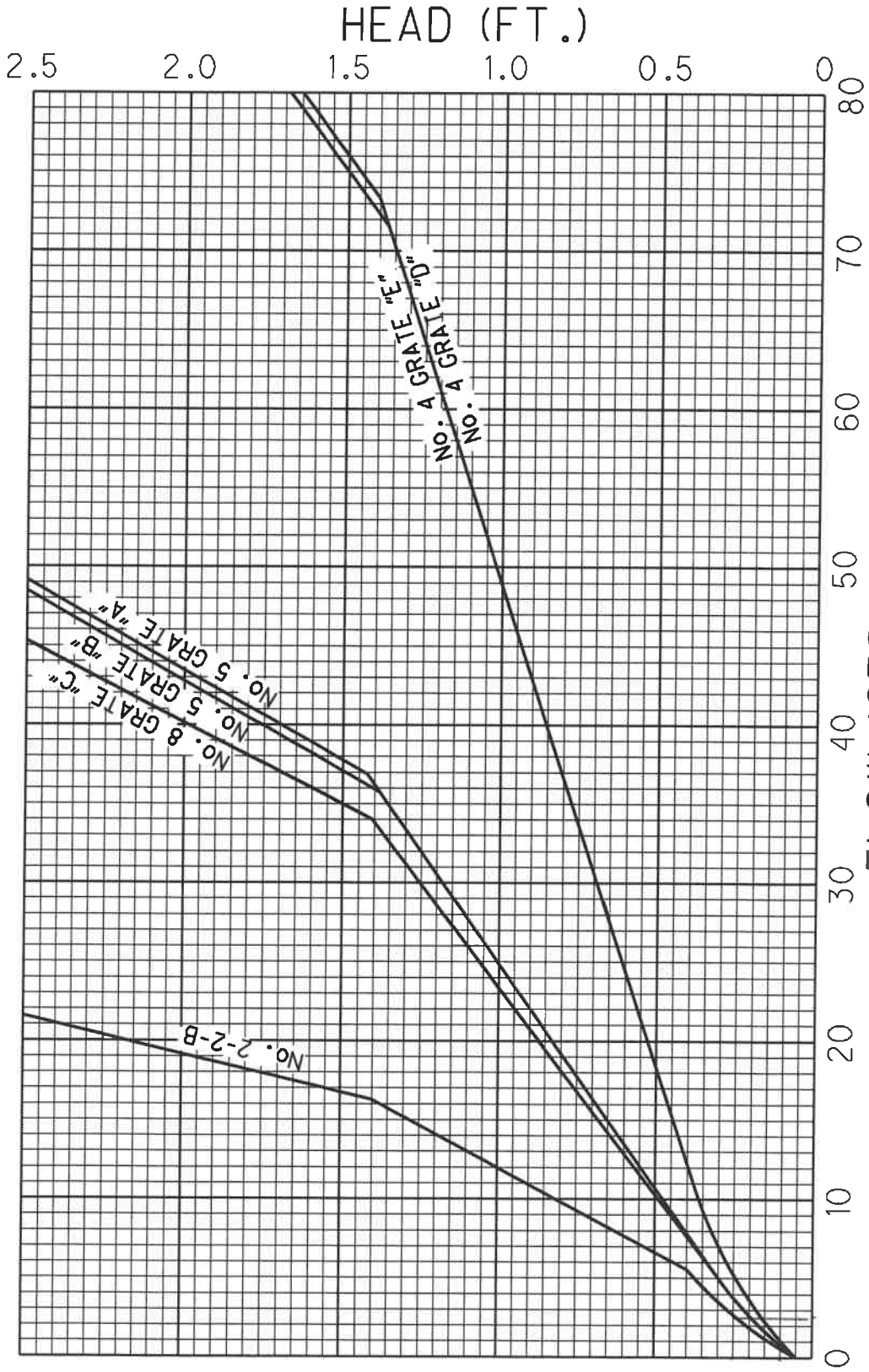
(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 528+75 | 528+50 | R | 25.00 | 0.00 | 2.00 | 2.00 | 0.1312* | 0.02 | 0.02 | 0.70 | 0.01 | Seed | 3.92 | 5 | 0.030 | 12.99 | 2.38 | 0.88 | 0.05 | 0.11 | 0.43 |
| | | | | | | | | | | | | Jute Mat | 3.91 | 5 | 0.040 | 13.03 | 1.96 | 0.97 | 0.05 | 0.12 | 0.47 |
| | | | | | | | | | | | | Temp. Mat | 3.91 | 5 | 0.040 | 13.03 | 1.96 | 0.97 | 0.05 | 0.12 | 0.47 |
| | | | | | | | | | | | | Temp. Mat | 4.41 | 10 | 0.040 | 13.04 | 1.86 | 1.06 | 0.06 | 0.13 | 0.52 |
| 528+50 | 528+00 | R | 50.00 | 2.00 | 2.00 | 2.00 | 0.1308* | 0.05 | 0.07 | 0.70 | 0.05 | Seed | 3.86 | 5 | 0.030 | 13.42 | 2.11 | 0.35 | 0.19 | 0.04 | 2.17 |
| | | | | | | | | | | | | Seed | 4.34 | 10 | 0.040 | 13.48 | 1.88 | 0.44 | 0.21 | 0.05 | 2.21 |
| 528+00 | 527+50 | R | 50.00 | 2.00 | 2.00 | 2.00 | 0.0054 | 0.09 | 0.16 | 0.70 | 0.11 | Seed | 3.75 | 5 | 0.030 | 14.23 | 1.01 | 0.06 | 0.42 | 0.18 | 2.71 |
| | | | | | | | | | | | | Seed | 4.21 | 10 | 0.040 | 14.43 | 0.88 | 0.07 | 0.47 | 0.22 | 2.88 |
| 527+50 | 526+75 | R | 75.00 | 2.00 | 2.00 | 2.00 | 0.0280 | 0.36 | 0.52 | 0.63 | 0.34 | Seed | 3.69 | 5 | 0.030 | 14.72 | 2.54 | 0.36 | 1.25 | 0.20 | 2.82 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.00 | 2.16 | 0.45 | 1.40 | 0.26 | 3.03 |

Behind Ex. Retaining Wall, no change to Ex. grading

| CAPACITY OF A GRATE CATCH BASIN IN A SUMP | 1102-1 |
|---|---|
| | **REFERENCE SECTION** 1102.3.5 |

526175 CB2-2B EB 76




$Q_{10}$ = 1.40 cfs double = 2.8 cfs

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

0.25

# DITCH ANALYSIS

**PID :** 101402 **Date :** 02/13/2019 **Project :** SUM-76/77 Central Int **Location :** EB I-76

**Description :**529+00 to 531+00 Right

**Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 529+00 | 530+00 | R | 100.00 | 2.00 | 2.00 | 2.00 | 0.0053 | 0.21 | 0.21 | 0.69 | 0.14 | Seed | 3.84 | 5 | 0.030 | 13.53 | 1.10 | 0.07 | 0.56 | 0.21 | 2.84 |
| | | | | | | | | | | | | Seed | 4.30 | 10 | 0.040 | 13.77 | 0.95 | 0.09 | 0.62 | 0.26 | 3.04 |
| 530+00 | 531+00 | R | 100.00 | 2.00 | 2.00 | 2.00 | 0.0180 | 0.22 | 0.43 | 0.69 | 0.30 | Seed | 3.74 | 5 | 0.030 | 14.32 | 2.09 | 0.24 | 1.11 | 0.22 | 2.87 |
| | | | | | | | | | | | | Seed | 4.17 | 10 | 0.040 | 14.69 | 1.79 | 0.30 | 1.24 | 0.27 | 3.08 |

# DITCH ANALYSIS

**PID :** 101402 **Date :** 04/04/2019 **Project :** SUM-76/77 Central Int **Location :** EB I-76

**Description :**531+00 to 534+00 Left **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| **RCP** | | **Type B:** | 6.00 | | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 531+00 | 532+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0196 | 0.23 | 0.23 | 0.74 | 0.17 | Seed | 3.82 | 5 | 0.015 | 13.69 | 2.30 | 0.08 | 0.65 | 0.07 | 4.27 |
| | | | | | | | | | | | | Seed | 4.32 | 10 | 0.015 | 13.66 | 2.40 | 0.09 | 0.73 | 0.07 | 4.30 |
| 532+00 | 533+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0348 | 0.40 | 0.63 | 0.74 | 0.47 | Seed | 3.73 | 5 | 0.030 | 14.34 | 2.55 | 0.34 | 1.74 | 0.16 | 4.63 |
| | | | | | | | | | | | | Seed | 4.21 | 10 | 0.040 | 14.41 | 2.21 | 0.44 | 1.96 | 0.20 | 4.81 |
| 533+00 | 534+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0177 | 0.35 | 0.98 | 0.74 | 0.73 | Seed | 3.65 | 5 | 0.030 | 15.03 | 2.38 | 0.27 | 2.65 | 0.25 | 4.99 |
| | | | | | | | | | | | | Seed | 4.10 | 10 | 0.040 | 15.21 | 2.06 | 0.35 | 2.97 | 0.31 | 5.25 |

# DITCH ANALYSIS

**PID :** 101402 **Date :** 03/11/2019 **Project :** SUM-76/77 Central Int **Location :** WB I-76

**Description :**516+00 (WB-76) to to 512+00 (Ex. 76) Left **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| | **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| | **RCP** | **Type B:** | 6.00 | | | | |

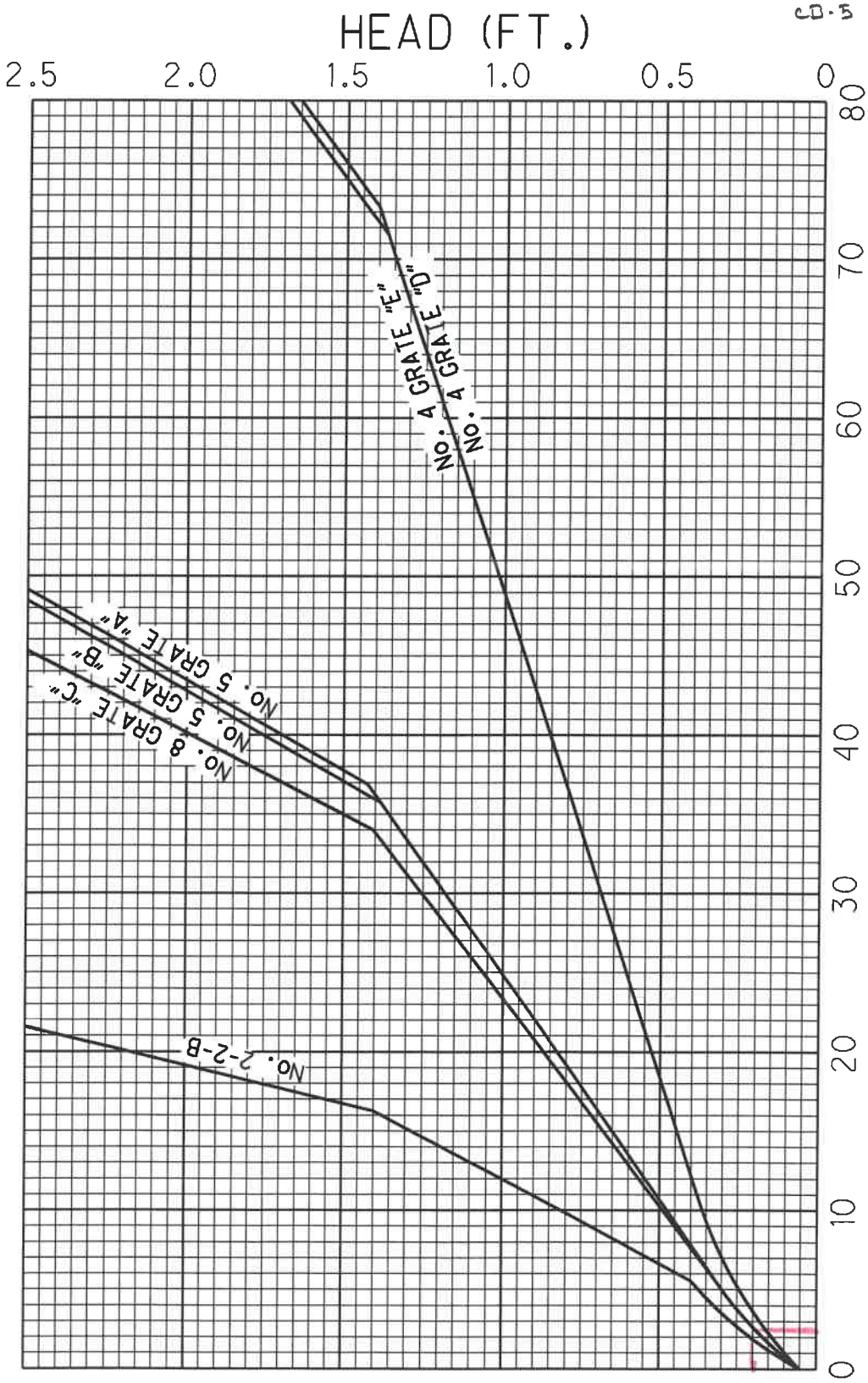
(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 516+00 | 515+37 | L | 63.00 | 2.00 | 2.00 | 2.00 | 0.0225 | 0.07 | 0.07 | 0.51 | 0.04 | Seed | 4.01 | 5 | 0.030 | 12.39 | 1.14 | 0.08 | 0.14 | 0.06 | 2.24 |
| | | | | | | | | | | | | Seed | 4.49 | 10 | 0.040 | 12.51 | 0.99 | 0.11 | 0.16 | 0.08 | 2.30 |
| 514+50 | 514+00 | L | 50.00 | 2.00 | 2.00 | 2.00 | 0.0252 | 0.11 | 0.18 | 0.51 | 0.09 | Seed | 3.93 | 5 | 0.030 | 12.90 | 1.60 | 0.16 | 0.36 | 0.10 | 2.41 |
| | | | | | | | | | | | | Seed | 4.40 | 10 | 0.040 | 13.12 | 1.39 | 0.20 | 0.40 | 0.13 | 2.52 |
| 514+00 | 513+00 | L | 100.00 | 2.00 | 2.00 | 2.00 | 0.0158 | 0.25 | 0.43 | 0.51 | 0.22 | Seed | 3.80 | 5 | 0.030 | 13.81 | 1.84 | 0.19 | 0.83 | 0.19 | 2.76 |
| | | | | | | | | | | | | Seed | 4.24 | 10 | 0.040 | 14.17 | 1.57 | 0.24 | 0.93 | 0.24 | 2.96 |
| 513+00 | 512+00 | L | 100.00 | 2.00 | 2.00 | 2.00 | 0.0262 | 0.12 | 0.55 | 0.51 | 0.28 | Seed | 3.71 | 5 | 0.030 | 14.52 | 2.33 | 0.31 | 1.04 | 0.19 | 2.75 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.00 | 1.98 | 0.39 | 1.16 | 0.24 | 2.95 |

| CAPACITY OF A GRATE CATCH BASIN IN A SUMP | 1102-1 |
|---|---|
| | **REFERENCE SECTION** 1102.3.5 |

WB-76 512+00 LT

CB-5




$Q_{10} = 1.16 \times 2 = 2.3$ cfs ⇒ Depth = 0.2' < 0.5' ∴ okay

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

-20

# DITCH ANALYSIS

**PID :** 101402 **Date :** 02/12/2019 **Project :** SUM-76/77 Central Int **Location :** WB I-76

**Description :**532+00 to 525+50 Rt Paved Gutter Behind Barrier

**Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 532+00 | 531+00 | R | 100.00 | 2.00 | 2.00 | 2.00 | 0.0374 | 0.07 | 0.07 | 0.70 | 0.05 | Seed | 4.04 | 5 | 0.015 | 12.20 | 2.21 | 0.10 | 0.20 | 0.04 | 2.17 |
| | | | | | | | | | | | | Seed | 4.55 | 10 | 0.015 | 12.16 | 2.34 | 0.11 | 0.22 | 0.05 | 2.18 |
| 531+00 | 530+00 | R | 100.00 | 2.00 | 2.00 | 2.00 | 0.0418 | 0.06 | 0.13 | 0.70 | 0.09 | Seed | 3.95 | 5 | 0.015 | 12.77 | 2.87 | 0.15 | 0.36 | 0.06 | 2.24 |
| | | | | | | | | | | | | Seed | 4.46 | 10 | 0.015 | 12.70 | 3.10 | 0.16 | 0.41 | 0.06 | 2.25 |
| 530+00 | 529+00 | R | 100.00 | 2.00 | 2.00 | 2.00 | 0.0345 | 0.05 | 0.18 | 0.70 | 0.13 | Seed | 3.87 | 5 | 0.015 | 13.31 | 3.08 | 0.16 | 0.49 | 0.07 | 2.30 |
| | | | | | | | | | | | | Seed | 4.38 | 10 | 0.015 | 13.22 | 3.23 | 0.17 | 0.55 | 0.08 | 2.32 |
| 529+00 | 528+00 | R | 100.00 | 2.00 | 2.00 | 2.00 | 0.0329 | 0.03 | 0.21 | 0.70 | 0.15 | Seed | 3.80 | 5 | 0.015 | 13.83 | 3.21 | 0.17 | 0.56 | 0.08 | 2.32 |
| | | | | | | | | | | | | Seed | 4.31 | 10 | 0.015 | 13.72 | 3.34 | 0.18 | 0.63 | 0.09 | 2.35 |
| 528+00 | 527+00 | R | 100.00 | 2.00 | 2.00 | 2.00 | 0.0318 | 0.02 | 0.23 | 0.70 | 0.16 | Seed | 3.73 | 5 | 0.015 | 14.34 | 3.22 | 0.17 | 0.60 | 0.09 | 2.34 |
| | | | | | | | | | | | | Seed | 4.24 | 10 | 0.015 | 14.21 | 3.37 | 0.18 | 0.68 | 0.09 | 2.37 |
| 527+00 | 526+00 | R | 100.00 | 2.00 | 2.00 | 2.00 | 0.0435 | 0.01 | 0.24 | 0.70 | 0.17 | Seed | 3.68 | 5 | 0.015 | 14.80 | 3.61 | 0.22 | 0.62 | 0.08 | 2.32 |
| | | | | | | | | | | | | Seed | 4.18 | 10 | 0.015 | 14.65 | 3.76 | 0.23 | 0.70 | 0.09 | 2.34 |
| 526+00 | 525+25 | R | 75.00 | 2.00 | 2.00 | 2.00 | 0.0340 | 0.01 | 0.25 | 0.70 | 0.18 | Seed | 3.63 | 5 | 0.015 | 15.17 | 3.35 | 0.19 | 0.64 | 0.09 | 2.35 |

# DITCH ANALYSIS

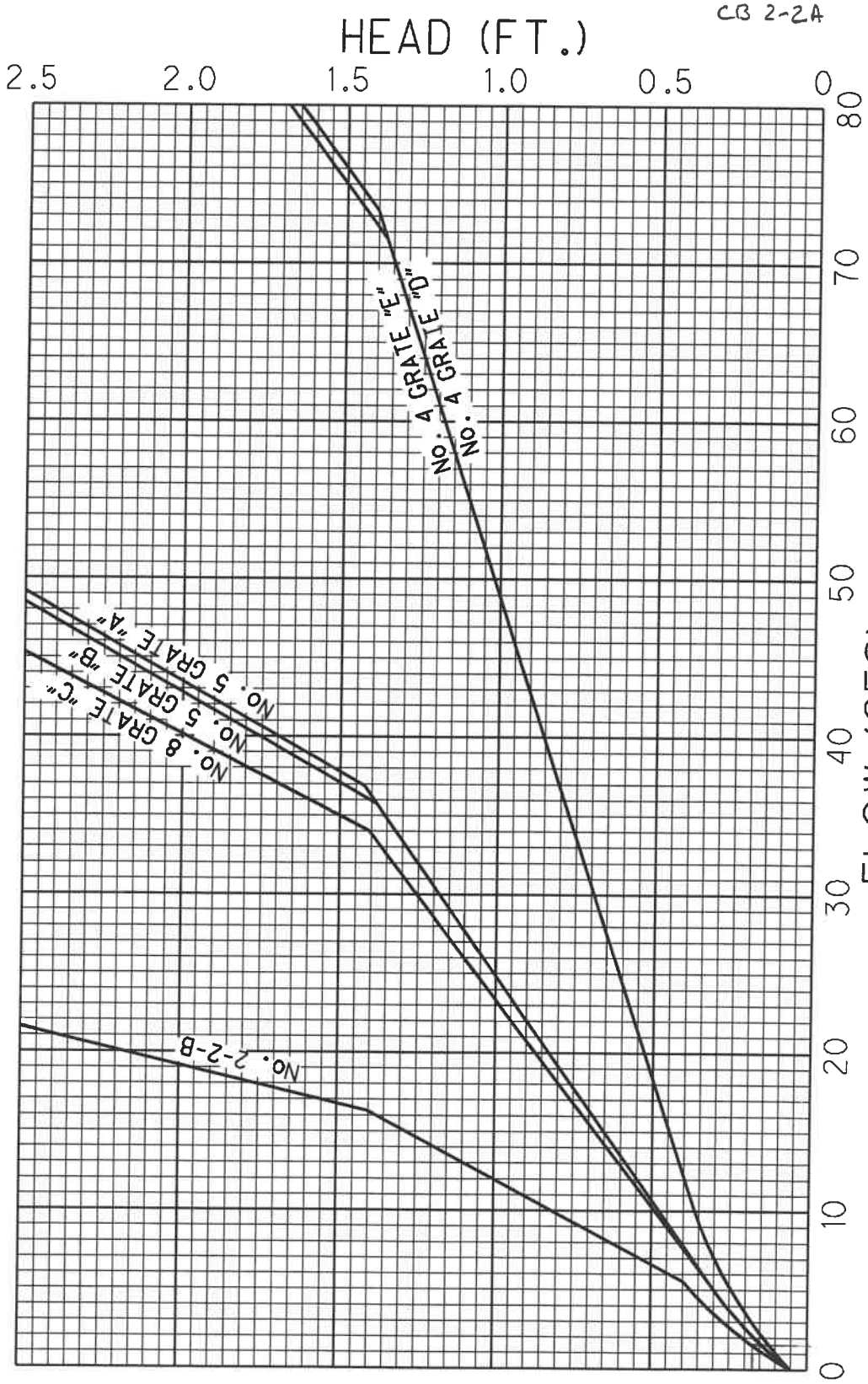
| STATION BEGIN | STATION END | SIDE LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Seed | 4.13 | 10 | 0.015 | 15.00 | 3.51 | 0.20 | 0.72 | 0.09 | 2.38 |

# CAPACITY OF A GRATE CATCH BASIN IN A SUMP

**1102-1**

**REFERENCE SECTION**
1102.3.5

Sta. 525+25 WB 76
CB 2-2A




Q = 0.72 cfs Doubled => 1.44

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

C.R.

# DITCH ANALYSIS

**PID :** 101402 **Date :** 04/05/2019 **Project :** SUM-76/77 Central Int **Location :** WB I-76

**Description :**538+50 to to 541+00 Right **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 538+50 | 539+00 | R | 50.00 | 4.00 | 2.00 | 2.00 | 0.0228 | 0.09 | 0.09 | 0.74 | 0.07 | Seed | 4.15 | 5 | 0.030 | 11.46 | 1.14 | 0.08 | 0.28 | 0.06 | 4.24 |
| | | | | | | | | | | | | Seed | 4.65 | 10 | 0.040 | 11.56 | 0.99 | 0.11 | 0.31 | 0.08 | 4.30 |
| 539+00 | 540+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0094 | 0.21 | 0.30 | 0.74 | 0.22 | Seed | 3.96 | 5 | 0.030 | 12.71 | 1.31 | 0.09 | 0.88 | 0.16 | 4.62 |
| | | | | | | | | | | | | Seed | 4.42 | 10 | 0.040 | 13.00 | 1.14 | 0.11 | 0.98 | 0.20 | 4.78 |
| 540+00 | 541+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0026 | 0.11 | 0.41 | 0.74 | 0.30 | Seed | 3.72 | 5 | 0.030 | 14.44 | 0.95 | 0.04 | 1.13 | 0.26 | 5.05 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.00 | 0.81 | 0.05 | 1.25 | 0.33 | 5.32 |

# DITCH ANALYSIS

**PID :** 101402 **Date :** 04/05/2019 **Project :** SUM-76/77 Central Int **Location :** WB I-76

**Description :**543+00 to to 541+00 Right **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| | **RCP** | **Type B:** | 6.00 | | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

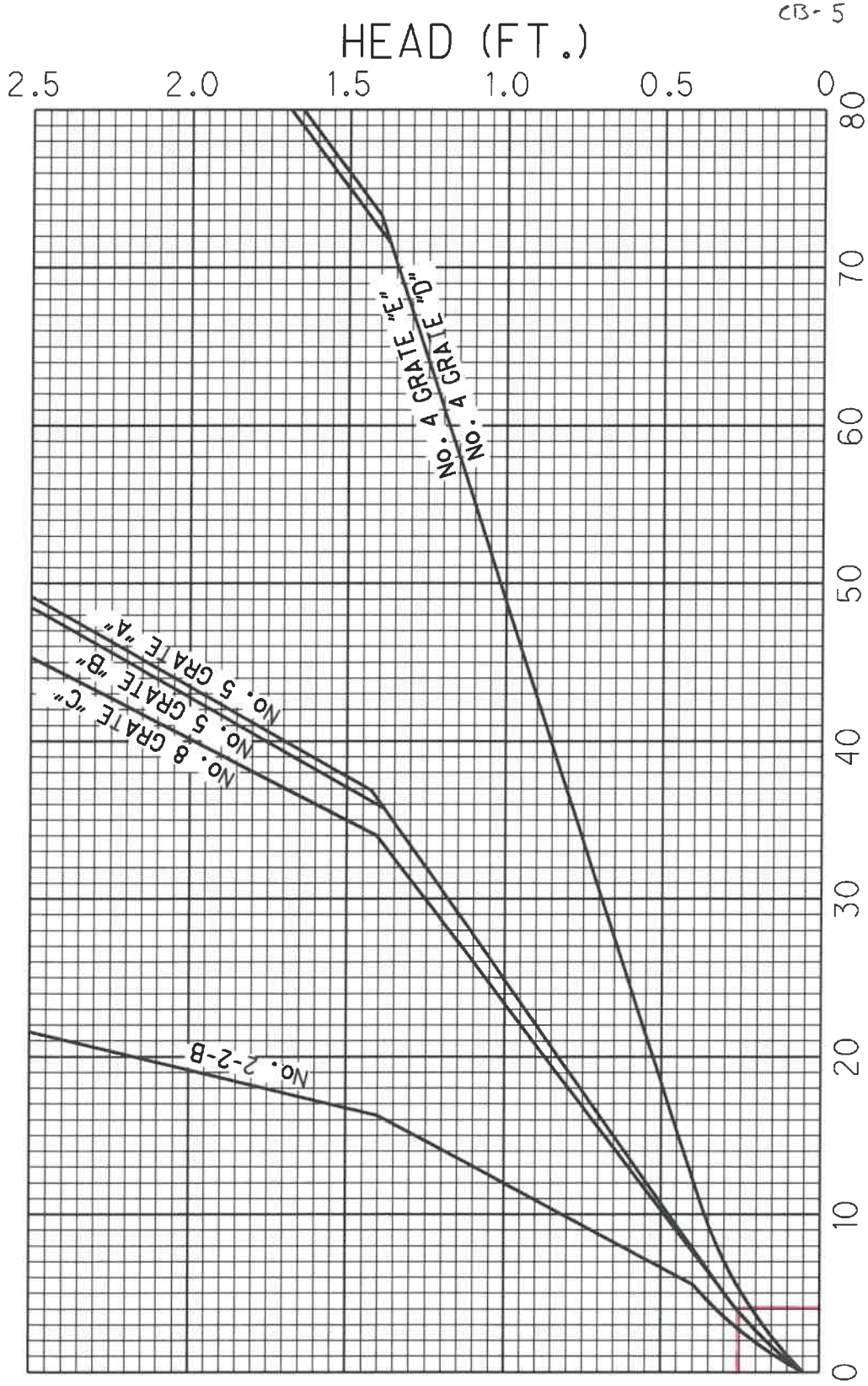
| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 543+00 | 542+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0228 | 0.12 | 0.12 | 0.76 | 0.09 | Seed | 3.85 | 5 | 0.030 | 13.46 | 1.22 | 0.10 | 0.35 | 0.07 | 4.28 |
| | | | | | | | | | | | | Seed | 4.32 | 10 | 0.040 | 13.66 | 1.06 | 0.13 | 0.39 | 0.09 | 4.35 |
| 542+00 | 541+00 | | 100.00 | 4.00 | 2.00 | 2.00 | 0.0153 | 0.13 | 0.25 | 0.76 | 0.19 | Seed | 3.70 | 5 | 0.030 | 14.62 | 1.40 | 0.11 | 0.70 | 0.12 | 4.47 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.00 | 1.22 | 0.14 | 0.78 | 0.15 | 4.60 |

# CAPACITY OF A GRATE CATCH BASIN IN A SUMP

1102-1

**REFERENCE SECTION**
1102.3.5

WB 76 Sta. 54+00 RT
CB-5




$Q_{10} = 1.25 + 0.78 = 2.03 \times 2 = 4.1$ ⇒ Depth = 0.25 < 0.5 : okay

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

5710

# DITCH ANALYSIS

**PID :** 101402 **Date :** 04/05/2019 **Project :** SUM-76/77 Central Int **Location :** WB I-76

**Description :**546+50 to to 543+00 Right **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

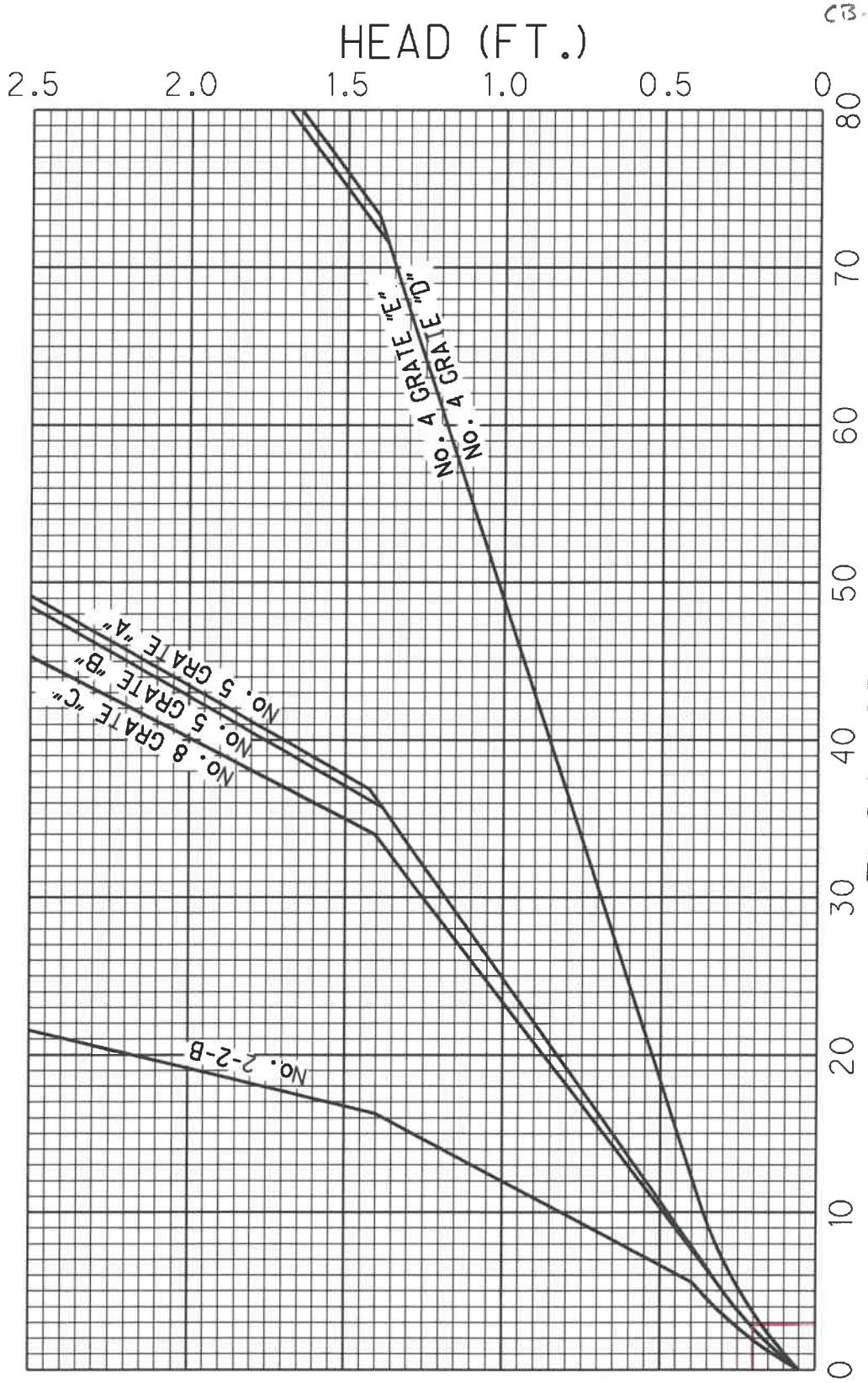
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| **RCP** | | **Type B:** | 6.00 | | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 546+50 | 546+00 | R | 50.00 | 1.00 | 6.00 | 6.00 | 0.0518 | 0.07 | 0.07 | 0.82 | 0.06 | Seed | 4.02 | 5 | 0.030 | 12.31 | 1.77 | 0.28 | 0.23 | 0.09 | 2.03 |
| | | | | | | | | | | | | Seed | 4.51 | 10 | 0.040 | 12.41 | 1.52 | 0.34 | 0.26 | 0.10 | 2.26 |
| 546+00 | 545+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0569 | 0.12 | 0.19 | 0.82 | 0.16 | Seed | 3.90 | 5 | 0.030 | 13.13 | 2.02 | 0.26 | 0.61 | 0.07 | 4.29 |
| | | | | | | | | | | | | Seed | 4.37 | 10 | 0.040 | 13.34 | 1.75 | 0.33 | 0.68 | 0.09 | 4.37 |
| 545+00 | 544+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0455 | 0.13 | 0.32 | 0.82 | 0.26 | Seed | 3.80 | 5 | 0.030 | 13.86 | 2.26 | 0.30 | 1.00 | 0.10 | 4.42 |
| | | | | | | | | | | | | Seed | 4.24 | 10 | 0.040 | 14.18 | 1.96 | 0.38 | 1.11 | 0.13 | 4.53 |
| 544+00 | 543+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0348 | 0.12 | 0.44 | 0.82 | 0.36 | Seed | 3.71 | 5 | 0.030 | 14.57 | 2.31 | 0.29 | 1.34 | 0.14 | 4.54 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.00 | 2.01 | 0.37 | 1.49 | 0.17 | 4.68 |

| CAPACITY OF A GRATE CATCH BASIN IN A SUMP | 1102-1 |
|---|---|
| | **REFERENCE SECTION** 1102.3.5 |

WB 76 Sta. 543+00 RT
CB-5




$Q_{10} = 1.49\ cfs \times 2 = 3.0\ cfs \Rightarrow$ Depth $= 0.2\ ft < 0.5\ ft \therefore$ okay

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

2.0

# DITCH ANALYSIS

**PID :** 101402 **Date :** 09/15/2017 **Project :** SUM-76/77 Central Int **Location :** West Bound 76

**Description :**550+50 to 560+00 Left (Removed Ramp E-2) **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 560+00 | 559+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0141 | 0.12 | 0.12 | 0.76 | 0.09 | Seed | 6.35 | 5 | 0.030 | 1.28 | 1.28 | 0.09 | 0.58 | 0.11 | 4.43 |
| | | | | | | | | | | | | Seed | 8.30 | 10 | 0.040 | 1.36 | 1.17 | 0.13 | 0.76 | 0.15 | 4.60 |
| 559+00 | 558+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0250 | 0.07 | 0.19 | 0.76 | 0.14 | Seed | 6.05 | 5 | 0.030 | 2.20 | 1.79 | 0.18 | 0.87 | 0.12 | 4.46 |
| | | | | | | | | | | | | Seed | 7.71 | 10 | 0.040 | 2.37 | 1.63 | 0.25 | 1.11 | 0.16 | 4.63 |
| 558+00 | 557+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0515 | 0.10 | 0.29 | 0.76 | 0.22 | Seed | 5.86 | 5 | 0.030 | 2.84 | 2.58 | 0.38 | 1.29 | 0.12 | 4.47 |
| | | | | | | | | | | | | Seed | 7.36 | 10 | 0.040 | 3.07 | 2.35 | 0.51 | 1.62 | 0.16 | 4.64 |
| 557+00 | 556+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0640 | 0.15 | 0.44 | 0.76 | 0.33 | Seed | 5.71 | 5 | 0.030 | 3.35 | 3.19 | 0.56 | 1.91 | 0.14 | 4.56 |
| | | | | | | | | | | | | Jute Mat | 5.68 | 5 | 0.040 | 3.46 | 2.66 | 0.66 | 1.90 | 0.17 | 4.66 |
| | | | | | | | | | | | | Temp. Mat | 5.68 | 5 | 0.040 | 3.46 | 2.66 | 0.66 | 1.90 | 0.17 | 4.66 |
| | | | | | | | | | | | | Temp. Mat | 7.09 | 10 | 0.040 | 3.64 | 2.88 | 0.75 | 2.37 | 0.19 | 4.75 |
| 556+00 | 555+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0693 | 0.18 | 0.62 | 0.76 | 0.47 | Seed | 5.56 | 5 | 0.030 | 3.90 | 3.68 | 0.71 | 2.62 | 0.16 | 4.66 |
| | | | | | | | | | | | | Jute Mat | 5.53 | 5 | 0.040 | 4.00 | 3.06 | 0.84 | 2.61 | 0.19 | 4.78 |
| | | | | | | | | | | | | Temp. Mat | 5.53 | 5 | 0.040 | 4.00 | 3.06 | 0.84 | 2.61 | 0.19 | 4.78 |

# DITCH ANALYSIS

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Temp. Mat | 6.88 | 10 | 0.040 | 4.14 | 3.30 | 0.96 | 3.24 | 0.22 | 4.88 |
| 555+00 | 554+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0542 | 0.20 | 0.82 | 0.76 | 0.62 | Seed | 5.42 | 5 | 0.030 | 4.44 | 3.73 | 0.69 | 3.38 | 0.21 | 4.82 |
| | | | | | | | | | | | | Jute Mat | 5.40 | 5 | 0.040 | 4.53 | 3.09 | 0.82 | 3.36 | 0.24 | 4.97 |
| | | | | | | | | | | | | Temp. Mat | 5.40 | 5 | 0.040 | 4.53 | 3.09 | 0.82 | 3.36 | 0.24 | 4.97 |
| | | | | | | | | | | | | Temp. Mat | 6.67 | 10 | 0.040 | 4.63 | 3.33 | 0.93 | 4.16 | 0.27 | 5.10 |
| 554+00 | 553+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0665 | 0.23 | 1.05 | 0.76 | 0.80 | Seed | 5.30 | 5 | 0.030 | 4.91 | 4.31 | 0.92 | 4.23 | 0.22 | 4.88 |
| | | | | | | | | | | | | Jute Mat | 5.28 | 5 | 0.040 | 4.99 | 3.58 | 1.08 | 4.22 | 0.26 | 5.04 |
| | | | | | | | | | | | | Temp. Mat | 5.28 | 5 | 0.040 | 4.99 | 3.58 | 1.08 | 4.22 | 0.26 | 5.04 |
| | | | | | | | | | | | | Perm, Type 1 | 5.28 | 5 | 0.040 | 4.99 | 3.58 | 1.08 | 4.22 | 0.26 | 5.04 |
| | | | | | | | | | | | | Perm, Type 1 | 6.51 | 10 | 0.040 | 5.06 | 3.84 | 1.22 | 5.19 | 0.29 | 5.18 |
| 553+00 | 552+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0425 | 0.31 | 1.36 | 0.76 | 1.03 | Seed | 5.19 | 5 | 0.030 | 5.40 | 4.05 | 0.77 | 5.36 | 0.29 | 5.16 |
| | | | | | | | | | | | | Jute Mat | 5.17 | 5 | 0.040 | 5.49 | 3.34 | 0.90 | 5.34 | 0.34 | 5.36 |
| | | | | | | | | | | | | Temp. Mat | 5.17 | 5 | 0.040 | 5.49 | 3.34 | 0.90 | 5.34 | 0.34 | 5.36 |
| | | | | | | | | | | | | Temp. Mat | 6.34 | 10 | 0.040 | 5.52 | 3.58 | 1.02 | 6.56 | 0.38 | 5.54 |
| 552+00 | 551+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0225 | 0.33 | 1.69 | 0.76 | 1.28 | Seed | 5.06 | 5 | 0.030 | 5.96 | 3.50 | 0.55 | 6.50 | 0.39 | 5.55 |
| | | | | | | | | | | | | Jute Mat | 5.04 | 5 | 0.040 | 6.06 | 2.88 | 0.64 | 6.47 | 0.46 | 5.83 |
| | | | | | | | | | | | | Temp. Mat | 5.04 | 5 | 0.040 | 6.06 | 2.88 | 0.64 | 6.47 | 0.46 | 5.83 |
| | | | | | | | | | | | | Temp. Mat | 6.16 | 10 | 0.040 | 6.06 | 3.07 | 0.72 | 7.91 | 0.51 | 6.05 |
| 551+00 | 550+75 | L | 25.00 | 4.00 | 2.00 | 2.00 | 0.0100 | 0.09 | 1.78 | 0.76 | 1.35 | Seed | 5.01 | 5 | 0.030 | 6.21 | 2.70 | 0.31 | 6.77 | 0.50 | 6.01 |
| | | | | | | | | | | | | Seed | 6.10 | 10 | 0.040 | 6.24 | 2.35 | 0.41 | 8.25 | 0.66 | 6.64 |

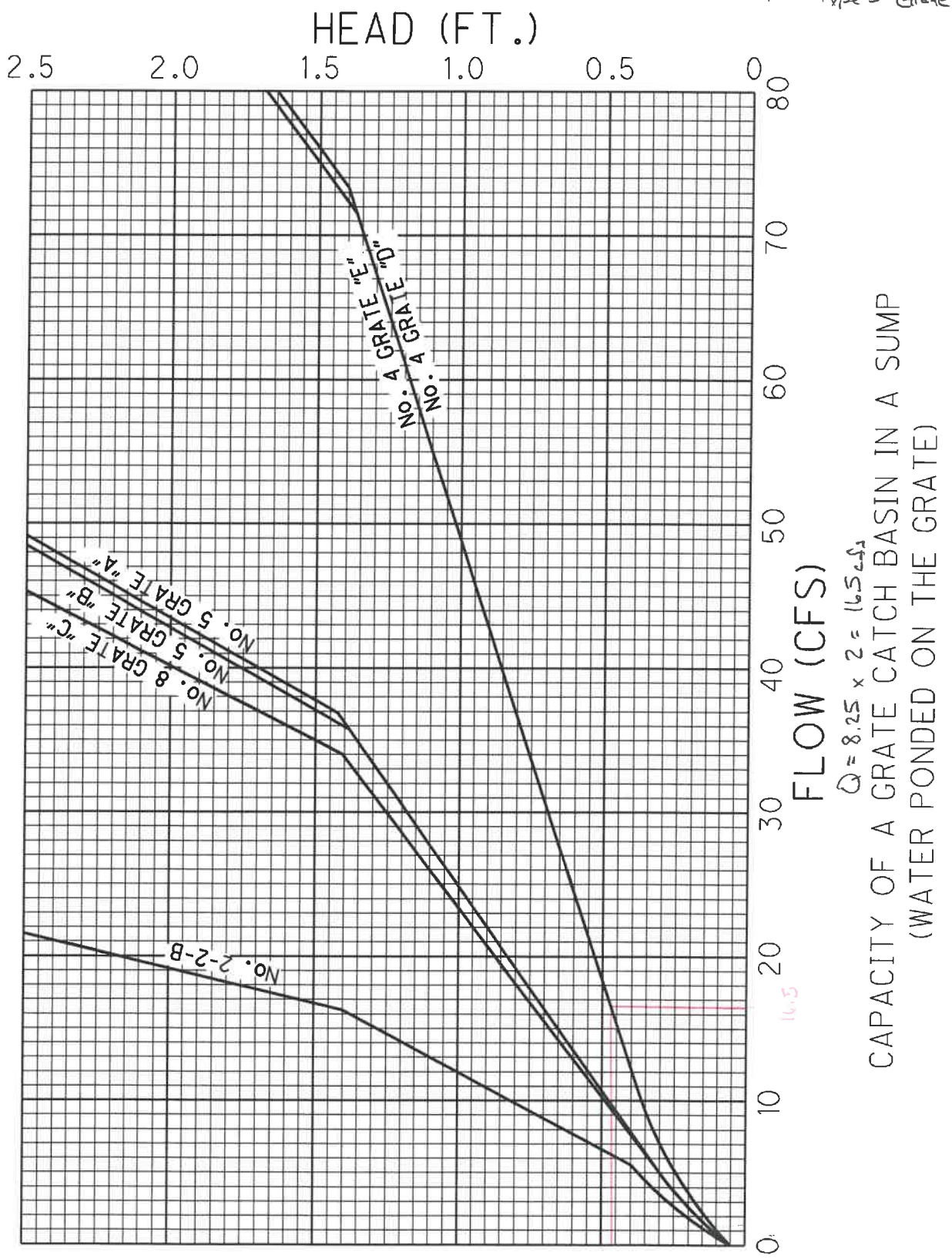
Sta. 550+50 (Ramp E-2)

# CAPACITY OF A GRATE CATCH BASIN IN A SUMP

1102-1

**REFERENCE SECTION**
1102.3.5

CB - 4 Type E Grate




$Q = 8.25 \times 2 = 16.5$ cfs

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

# DITCH ANALYSIS

**PID :** 101402 **Date :** 10/06/2017 **Project :** SUM-76/77 Central Int **Location :** WB I-76

**Description :**538+50 to to 541+00 Right **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| **RCP** | | **Type B:** | 6.00 | | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 538+50 | 539+00 | R | 50.00 | 4.00 | 2.00 | 2.00 | 0.0230 | 0.09 | 0.09 | 0.74 | 0.07 | Seed | 3.93 | 5 | 0.030 | 12.49 | 1.08 | 0.08 | 0.26 | 0.06 | 4.24 |
| | | | | | | | | | | | | Seed | 4.59 | 10 | 0.040 | 12.59 | 0.98 | 0.11 | 0.31 | 0.08 | 4.30 |
| 539+00 | 540+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0125 | 0.21 | 0.30 | 0.74 | 0.22 | Seed | 3.78 | 5 | 0.030 | 13.65 | 1.40 | 0.11 | 0.84 | 0.14 | 4.56 |
| | | | | | | | | | | | | Seed | 4.36 | 10 | 0.040 | 13.92 | 1.24 | 0.14 | 0.97 | 0.18 | 4.72 |
| 540+00 | 541+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0173 | 0.11 | 0.41 | 0.74 | 0.30 | Seed | 3.67 | 5 | 0.030 | 14.60 | 1.74 | 0.16 | 1.11 | 0.15 | 4.60 |
| | | | | | | | | | | | | Seed | 4.20 | 10 | 0.040 | 15.00 | 1.51 | 0.21 | 1.27 | 0.19 | 4.77 |

# DITCH ANALYSIS

**PID :** 101402 **Date :** 10/06/2017 **Project :** SUM-76/77 Central Int **Location :** WB I-76

**Description :**543+00 to to 541+00 Right **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 543+00 | 542+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0212 | 0.12 | 0.12 | 0.76 | 0.09 | Seed | 3.77 | 5 | 0.030 | 13.74 | 1.19 | 0.09 | 0.34 | 0.07 | 4.28 |
| | | | | | | | | | | | | Seed | 4.37 | 10 | 0.040 | 13.90 | 1.04 | 0.12 | 0.40 | 0.09 | 4.37 |
| 542+00 | 541+00 | | 100.00 | 4.00 | 2.00 | 2.00 | 0.0289 | 0.13 | 0.25 | 0.76 | 0.19 | Seed | 3.65 | 5 | 0.030 | 14.71 | 1.71 | 0.17 | 0.69 | 0.10 | 4.39 |
| | | | | | | | | | | | | Seed | 4.20 | 10 | 0.040 | 15.00 | 1.50 | 0.23 | 0.80 | 0.12 | 4.50 |

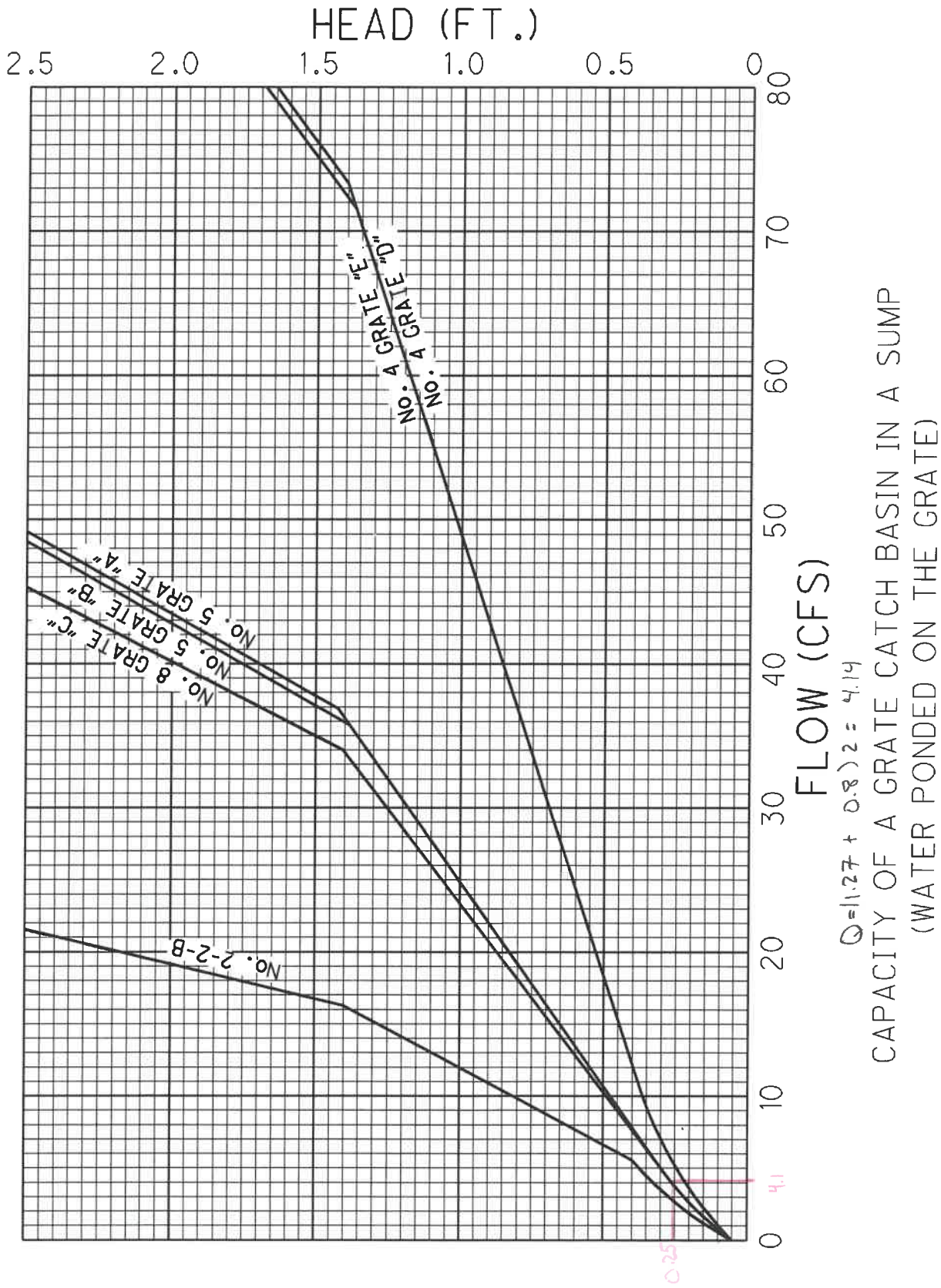
I-76 WB Sta. 541400 RT

# CAPACITY OF A GRATE CATCH BASIN IN A SUMP

1102-1

**REFERENCE SECTION**
1102.3.5

CB-8




$Q = (1.27 + 0.8)2 = 4.14$

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

# DITCH ANALYSIS

**PID :** 101402 **Date :** 10/09/2017 **Project :** SUM-76/77 Central Int **Location :** WB I-76

**Description :**546+50 to to 543+00 Right **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 546+50 | 546+00 | R | 50.00 | 4.00 | 2.00 | 2.00 | 0.0424 | 0.07 | 0.07 | 0.82 | 0.06 | Seed | 4.00 | 5 | 0.030 | 11.98 | 1.23 | 0.12 | 0.23 | 0.05 | 4.18 |
| | | | | | | | | | | | | Seed | 4.68 | 10 | 0.040 | 12.05 | 1.10 | 0.16 | 0.27 | 0.06 | 4.24 |
| 546+00 | 545+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0476 | 0.12 | 0.19 | 0.82 | 0.16 | Seed | 3.89 | 5 | 0.030 | 12.84 | 1.90 | 0.23 | 0.61 | 0.08 | 4.31 |
| | | | | | | | | | | | | Seed | 4.51 | 10 | 0.040 | 13.03 | 1.68 | 0.30 | 0.70 | 0.10 | 4.40 |
| 545+00 | 544+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0512 | 0.13 | 0.32 | 0.82 | 0.26 | Seed | 3.80 | 5 | 0.030 | 13.54 | 2.35 | 0.32 | 1.00 | 0.10 | 4.40 |
| | | | | | | | | | | | | Seed | 4.38 | 10 | 0.040 | 13.83 | 2.07 | 0.42 | 1.15 | 0.13 | 4.52 |
| 544+00 | 543+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0111 | 0.12 | 0.44 | 0.82 | 0.36 | Seed | 3.67 | 5 | 0.030 | 14.57 | 1.61 | 0.13 | 1.32 | 0.19 | 4.75 |
| | | | | | | | | | | | | Seed | 4.20 | 10 | 0.040 | 15.00 | 1.40 | 0.17 | 1.52 | 0.24 | 4.97 |

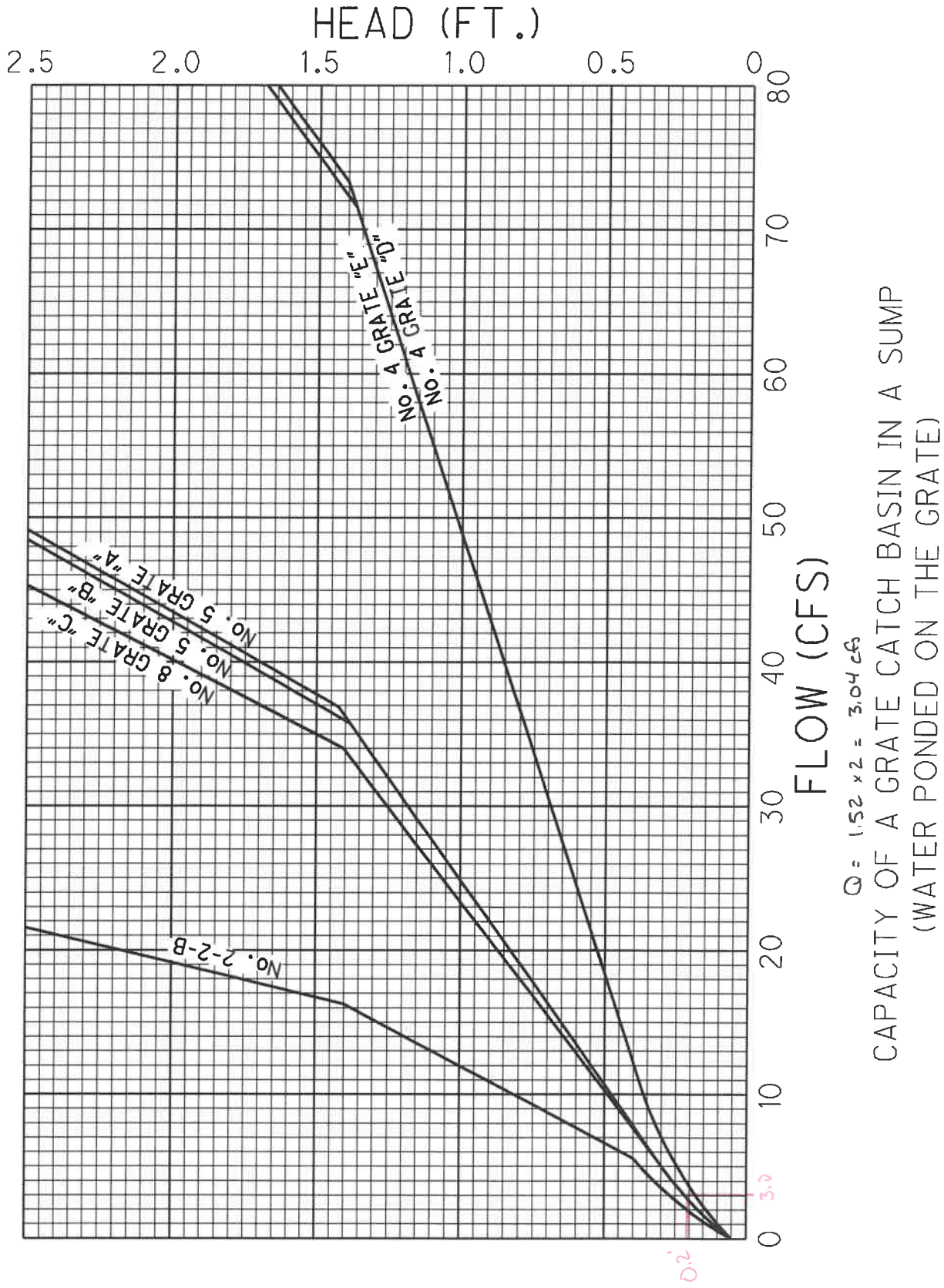
I-76 WB Sta. 543+00 RT

# CAPACITY OF A GRATE CATCH BASIN IN A SUMP

1102-1

**REFERENCE SECTION**
1102.3.5

CB-8




Q = 1.52 x 2 = 3.04 cfs

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

# DITCH ANALYSIS

**PID :** 101402 **Date :** 10/09/2017 **Project :** SUM-76/77 Central Int **Location :** WB I-76

**Description :**538+50 to to 541+00 Left **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| | **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| | **RCP** | **Type B:** | 6.00 | | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 538+50 | 539+00 | L | 50.00 | 4.00 | 2.00 | 2.00 | 0.0244 | 0.02 | 0.02 | 0.73 | 0.01 | Seed | 4.04 | 5 | 0.030 | 11.72 | 0.68 | 0.03 | 0.06 | 0.02 | 4.09 |
| | | | | | | | | | | | | Seed | 4.71 | 10 | 0.040 | 11.89 | 0.53 | 0.05 | 0.07 | 0.03 | 4.13 |
| 539+00 | 540+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0164 | 0.08 | 0.10 | 0.73 | 0.07 | Seed | 3.82 | 5 | 0.030 | 13.35 | 1.00 | 0.07 | 0.28 | 0.07 | 4.27 |
| | | | | | | | | | | | | Seed | 4.40 | 10 | 0.040 | 13.69 | 0.90 | 0.09 | 0.32 | 0.09 | 4.34 |
| 540+00 | 541+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0172 | 0.14 | 0.24 | 0.73 | 0.18 | Seed | 3.68 | 5 | 0.030 | 14.51 | 1.42 | 0.12 | 0.64 | 0.11 | 4.43 |
| | | | | | | | | | | | | Seed | 4.20 | 10 | 0.040 | 15.00 | 1.23 | 0.15 | 0.74 | 0.14 | 4.56 |

# DITCH ANALYSIS

**PID :** 101402 **Date :** 10/09/2017 **Project :** SUM-76/77 Central Int **Location :** WB I-76

**Description :**543+00 to to 541+00 Left **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 543+00 | 542+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0212 | 0.18 | 0.18 | 0.80 | 0.14 | Seed | 3.75 | 5 | 0.030 | 13.93 | 1.41 | 0.12 | 0.54 | 0.09 | 4.37 |
| | | | | | | | | | | | | Seed | 4.34 | 10 | 0.040 | 14.07 | 1.25 | 0.16 | 0.62 | 0.12 | 4.47 |
| 542+00 | 541+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0211 | 0.31 | 0.49 | 0.80 | 0.39 | Seed | 3.65 | 5 | 0.030 | 14.75 | 2.02 | 0.22 | 1.43 | 0.16 | 4.66 |
| | | | | | | | | | | | | Seed | 4.20 | 10 | 0.040 | 15.00 | 1.78 | 0.28 | 1.65 | 0.21 | 4.84 |

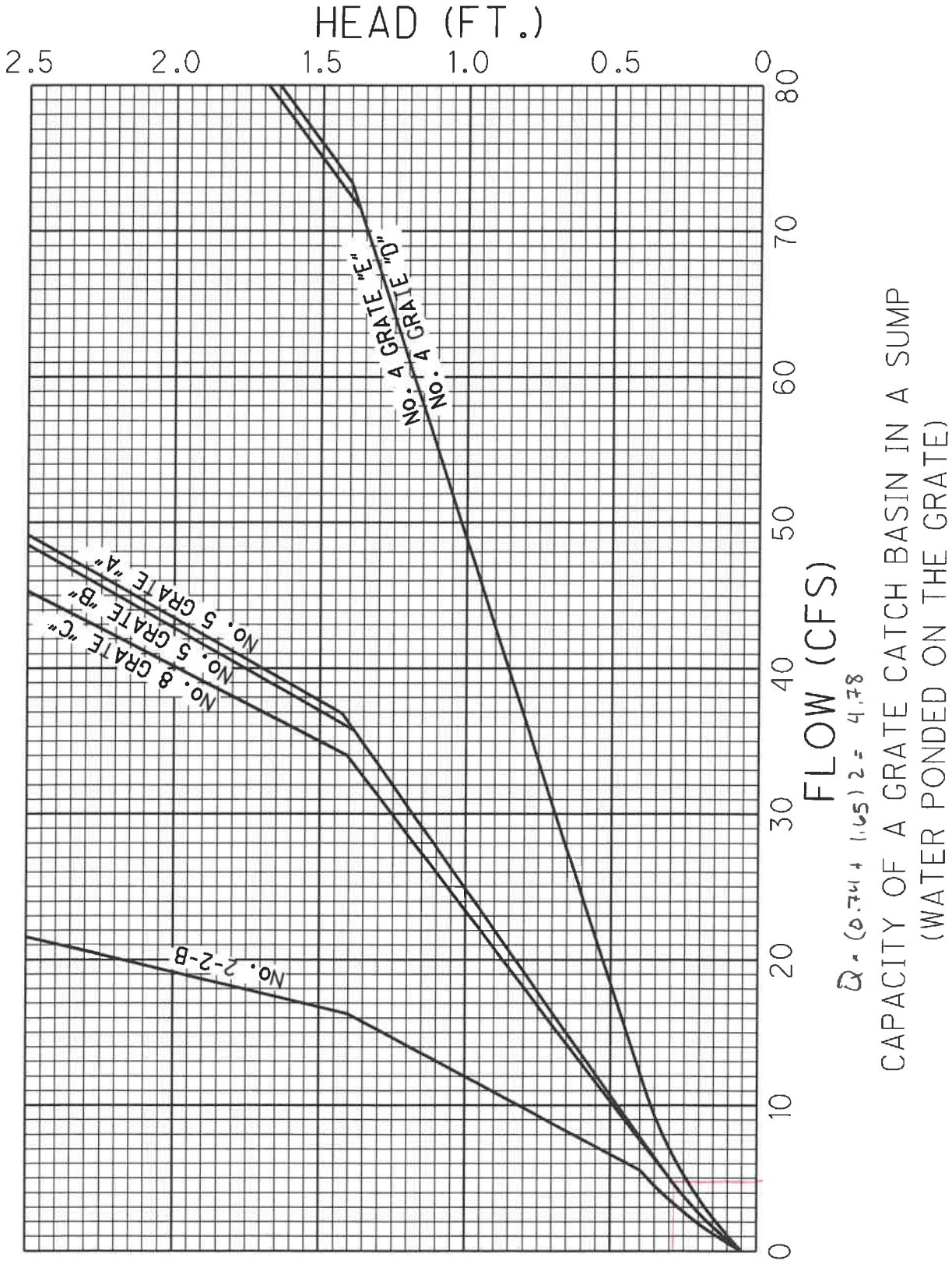
I-76 4/B 541+00 LT

# CAPACITY OF A GRATE CATCH BASIN IN A SUMP

1102-1

**REFERENCE SECTION**
1102.3.5

CB - Existing




Q = (0.74 + 1.65) 2 = 4.78

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

# DITCH ANALYSIS

**PID :** 101402 **Date :** 12/06/2017 **Project :** SUM-76/77 Central Int **Location :** SR 8

**Description :** SR 8 4295+50 to 4302+30 Lt **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

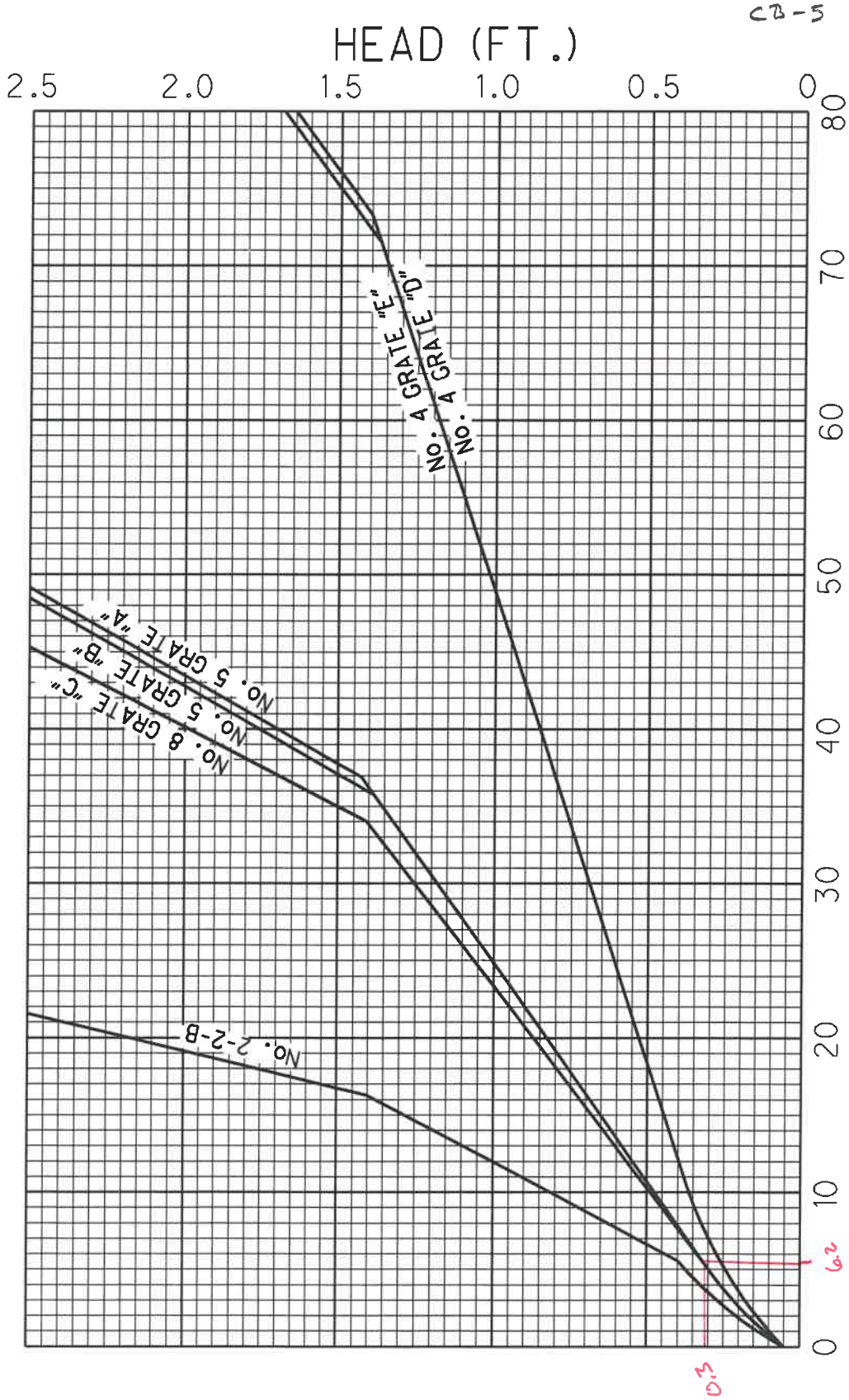
| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4295+50 | 4296+00 | L | 50.00 | 4.00 | 2.00 | 2.00 | 0.0270 | 0.02 | 0.02 | 0.78 | 0.02 | Seed | 4.71 | 5 | 0.030 | 7.68 | 0.67 | 0.05 | 0.07 | 0.03 | 4.11 |
| | | | | | | | | | | | | Seed | 5.62 | 10 | 0.040 | 7.86 | 0.67 | 0.05 | 0.09 | 0.03 | 4.13 |
| 4296+00 | 4297+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0147 | 0.07 | 0.09 | 0.78 | 0.07 | Seed | 4.42 | 5 | 0.030 | 9.25 | 1.03 | 0.07 | 0.31 | 0.07 | 4.29 |
| | | | | | | | | | | | | Seed | 5.18 | 10 | 0.040 | 9.62 | 0.90 | 0.09 | 0.36 | 0.10 | 4.39 |
| 4297+00 | 4298+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0393 | 0.10 | 0.19 | 0.78 | 0.15 | Seed | 4.27 | 5 | 0.030 | 10.16 | 1.83 | 0.20 | 0.63 | 0.08 | 4.33 |
| | | | | | | | | | | | | Seed | 4.96 | 10 | 0.040 | 10.64 | 1.60 | 0.27 | 0.73 | 0.11 | 4.44 |
| 4298+00 | 4299+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0061 | 0.17 | 0.36 | 0.78 | 0.28 | Seed | 4.08 | 5 | 0.030 | 11.46 | 1.25 | 0.08 | 1.14 | 0.21 | 4.83 |
| | | | | | | | | | | | | Seed | 4.67 | 10 | 0.040 | 12.14 | 1.09 | 0.10 | 1.31 | 0.26 | 5.06 |
| 4299+00 | 4300+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0127 | 0.17 | 0.53 | 0.78 | 0.41 | Seed | 3.95 | 5 | 0.030 | 12.38 | 1.80 | 0.16 | 1.63 | 0.21 | 4.82 |
| | | | | | | | | | | | | Seed | 4.48 | 10 | 0.040 | 13.19 | 1.56 | 0.21 | 1.85 | 0.26 | 5.05 |
| 4300+00 | 4301+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0193 | 0.17 | 0.70 | 0.78 | 0.55 | Seed | 3.85 | 5 | 0.030 | 13.11 | 2.26 | 0.25 | 2.10 | 0.21 | 4.84 |
| | | | | | | | | | | | | Seed | 4.35 | 10 | 0.040 | 14.03 | 1.96 | 0.32 | 2.37 | 0.27 | 5.07 |
| 4301+00 | 4302+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0249 | 0.17 | 0.87 | 0.78 | 0.68 | Seed | 3.77 | 5 | 0.030 | 13.74 | 2.63 | 0.34 | 2.56 | 0.22 | 4.88 |

# DITCH ANALYSIS

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Seed | 4.23 | 10 | 0.040 | 14.76 | 2.27 | 0.43 | 2.87 | 0.28 | 5.11 |
| 4302+00 | 4302+30 | L | 30.00 | 4.00 | 2.00 | 2.00 | 0.0173 | 0.08 | 0.95 | 0.78 | 0.74 | Seed | 3.74 | 5 | 0.030 | 13.95 | 2.41 | 0.28 | 2.77 | 0.26 | 5.02 |
| | | | | | | | | | | | | Seed | 4.20 | 10 | 0.040 | 15.00 | 2.07 | 0.35 | 3.11 | 0.32 | 5.29 |

| CAPACITY OF A GRATE CATCH BASIN IN A SUMP | 1102-1 |
|---|---|
| | **REFERENCE SECTION** 1102.3.5 |

SR 8 4302+30 LT
CB-5




Q = 3.11 x 2 = 6.22cfs

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

# DITCH ANALYSIS

**PID :** 101402 **Date :** 12/06/2017 **Project :** SUM-76/77 Central Int **Location :** SR 8

**Description :**SR 8 4302+30 to 4306+00 Lt

**Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

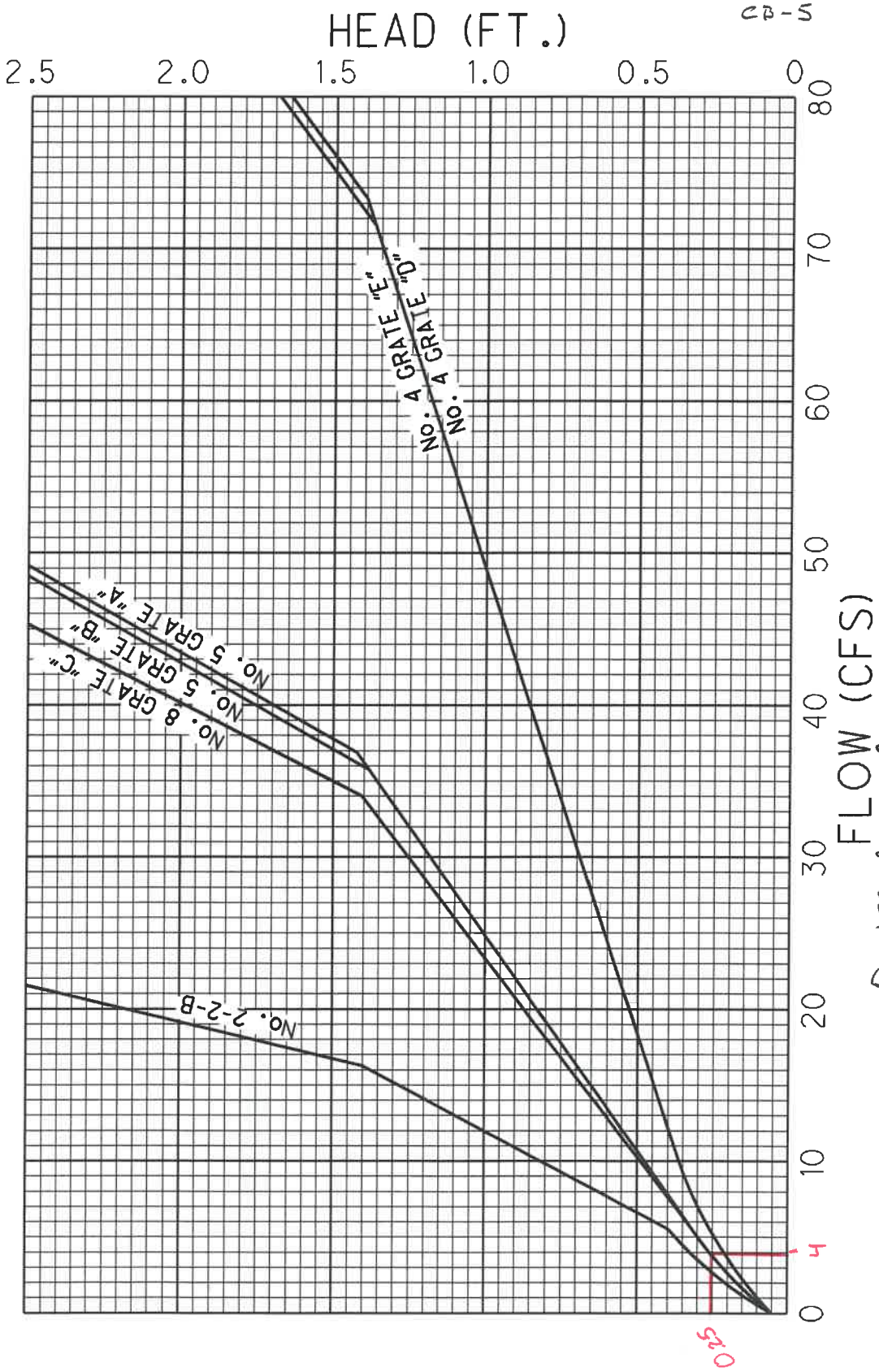
(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4302+30 | 4303+00 | L | 70.00 | 4.00 | 2.00 | 2.00 | 0.0426 | 0.11 | 0.11 | 0.79 | 0.09 | Seed | 3.97 | 5 | 0.030 | 12.21 | 1.49 | 0.15 | 0.35 | 0.06 | 4.23 |
| | | | | | | | | | | | | Seed | 4.64 | 10 | 0.040 | 12.30 | 1.32 | 0.20 | 0.40 | 0.07 | 4.30 |
| 4303+00 | 4304+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0264 | 0.18 | 0.29 | 0.79 | 0.23 | Seed | 3.85 | 5 | 0.030 | 13.12 | 1.83 | 0.19 | 0.88 | 0.11 | 4.46 |
| | | | | | | | | | | | | Seed | 4.46 | 10 | 0.040 | 13.33 | 1.61 | 0.24 | 1.02 | 0.15 | 4.59 |
| 4304+00 | 4305+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0272 | 0.17 | 0.46 | 0.79 | 0.36 | Seed | 3.75 | 5 | 0.030 | 13.88 | 2.15 | 0.25 | 1.36 | 0.15 | 4.59 |
| | | | | | | | | | | | | Seed | 4.32 | 10 | 0.040 | 14.20 | 1.89 | 0.32 | 1.57 | 0.19 | 4.76 |
| 4305+00 | 4306+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0277 | 0.14 | 0.60 | 0.79 | 0.47 | Seed | 3.67 | 5 | 0.030 | 14.58 | 2.37 | 0.29 | 1.74 | 0.17 | 4.68 |
| | | | | | | | | | | | | Seed | 4.20 | 10 | 0.040 | 15.00 | 2.06 | 0.38 | 1.99 | 0.22 | 4.87 |

| CAPACITY OF A GRATE CATCH BASIN IN A SUMP | 1102-1 |
|---|---|
| | **REFERENCE SECTION** 1102.3.5 |

SR 8 Sta. 4306+00 L

CB-5




Q = 1.99 x 2 = 4 cfs

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

# DITCH ANALYSIS

**PID :** 101402 **Date :** 04/02/2019 **Project :** SUM-76/77 Central Int **Location :** Lane M

**Description :** 1530+50 to 1534+75 Left

**Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1530+50 | 1531+50 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0314 | 0.23 | 0.23 | 0.65 | 0.15 | Seed | 4.10 | 5 | 0.030 | 11.76 | 1.68 | 0.17 | 0.61 | 0.09 | 4.35 |
| | | | | | | | | | | | | Seed | 4.60 | 10 | 0.040 | 11.90 | 1.46 | 0.22 | 0.69 | 0.11 | 4.45 |
| 1531+50 | 1532+50 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0211 | 0.17 | 0.40 | 0.65 | 0.26 | Seed | 3.96 | 5 | 0.030 | 12.67 | 1.80 | 0.18 | 1.03 | 0.13 | 4.54 |
| | | | | | | | | | | | | Seed | 4.42 | 10 | 0.040 | 12.96 | 1.55 | 0.22 | 1.15 | 0.17 | 4.68 |
| 1032+50 | 1033+50 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0206 | 0.34 | 0.74 | 0.65 | 0.48 | Seed | 3.86 | 5 | 0.030 | 13.42 | 2.20 | 0.25 | 1.86 | 0.19 | 4.77 |
| | | | | | | | | | | | | Seed | 4.29 | 10 | 0.040 | 13.82 | 1.91 | 0.31 | 2.07 | 0.24 | 4.97 |
| 1033+50 | 1034+75 | L | 125.00 | 4.00 | 2.00 | 2.00 | 0.0151 | 0.85 | 1.59 | 0.65 | 1.03 | Seed | 3.75 | 5 | 0.030 | 14.22 | 2.58 | 0.31 | 3.88 | 0.32 | 5.29 |
| | | | | | | | | | | | | Seed | 4.16 | 10 | 0.040 | 14.75 | 2.21 | 0.38 | 4.30 | 0.41 | 5.62 |

# DITCH ANALYSIS

**PID :** 101402 **Date :** 12/13/2017 **Project :** SUM-76/77 Central Int **Location :** Lane M

**Description :** 1534+75 to 1537+35 Left **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

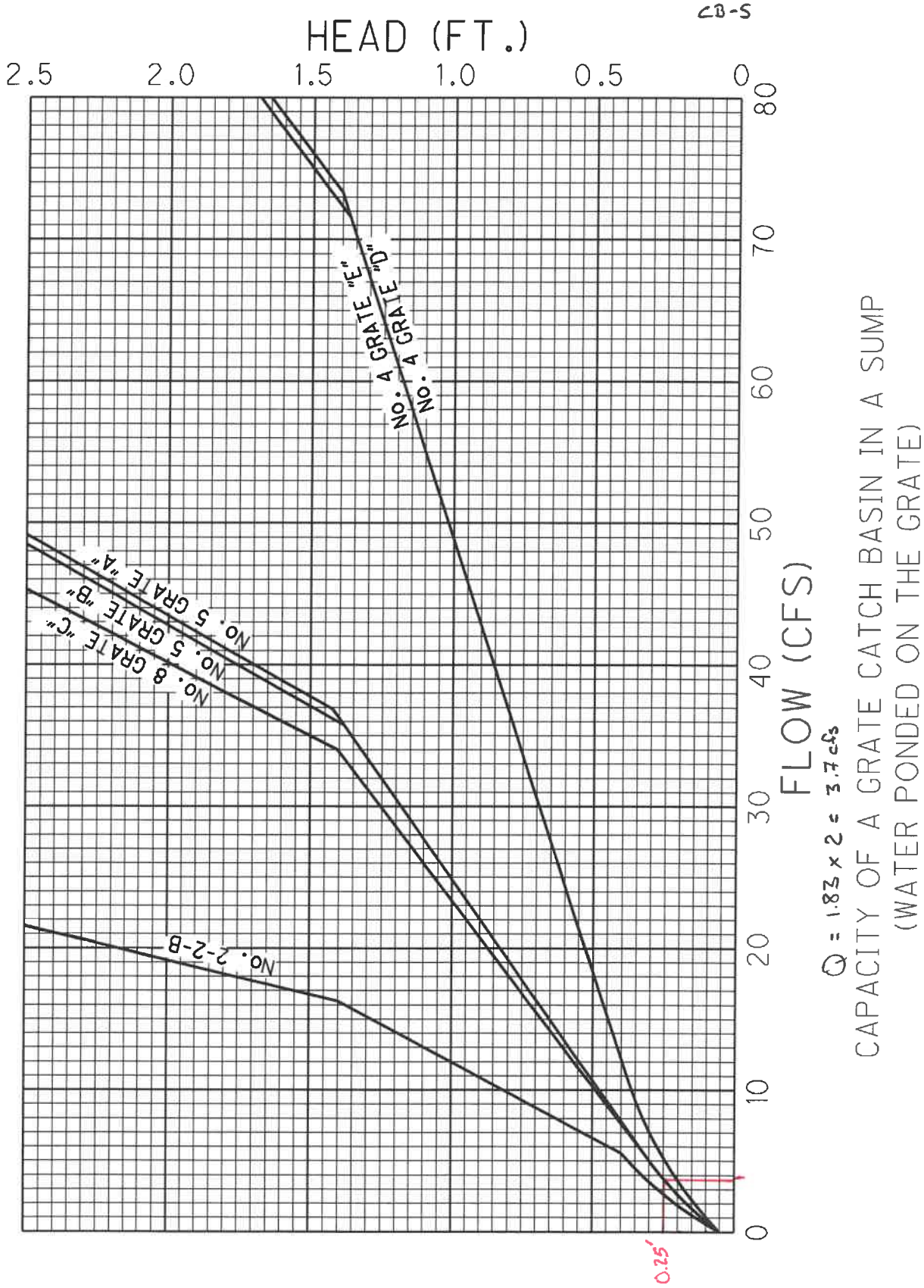
| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1534+75 | 1536+00 | L | 125.00 | 4.00 | 2.00 | 2.00 | 0.0241 | 0.21 | 0.21 | 0.57 | 0.12 | Seed | 3.78 | 5 | 0.030 | 13.66 | 1.37 | 0.12 | 0.45 | 0.08 | 4.32 |
| | | | | | | | | | | | | Seed | 4.37 | 10 | 0.040 | 13.86 | 1.22 | 0.15 | 0.52 | 0.10 | 4.41 |
| 1536+00 | 1537+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0211 | 0.36 | 0.57 | 0.79 | 0.40 | Seed | 3.68 | 5 | 0.030 | 14.46 | 2.06 | 0.22 | 1.49 | 0.17 | 4.67 |
| | | | | | | | | | | | | Seed | 4.23 | 10 | 0.040 | 14.77 | 1.80 | 0.28 | 1.71 | 0.21 | 4.86 |
| 1537+00 | 1537+35 | L | 35.00 | 4.00 | 2.00 | 2.00 | 0.0597 | 0.04 | 0.61 | 0.79 | 0.44 | Seed | 3.66 | 5 | 0.030 | 14.66 | 2.94 | 0.48 | 1.59 | 0.13 | 4.51 |
| | | | | | | | | | | | | Jute Mat | 3.65 | 5 | 0.040 | 14.70 | 2.44 | 0.57 | 1.59 | 0.15 | 4.61 |
| | | | | | | | | | | | | Temp. Mat | 3.65 | 5 | 0.040 | 14.70 | 2.44 | 0.57 | 1.59 | 0.15 | 4.61 |
| | | | | | | | | | | | | Temp. Mat | 4.20 | 10 | 0.040 | 15.00 | 2.57 | 0.61 | 1.83 | 0.16 | 4.66 |

| CAPACITY OF A GRATE CATCH BASIN IN A SUMP | 1102-1 |
|---|---|
| | **REFERENCE SECTION** 1102.3.5 |

Lane M 1537+35 LT
CB-5




Q = 1.83 x 2 = 3.7 cfs

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

# DITCH ANALYSIS

**PID :** 101402 **Date :** 12/13/2017 **Project :** SUM-76/77 Central Int **Location :** Lane N

**Description :**3329+00 to 3333+00 Left **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3329+00 | 3330+00 | L | 100.00 | 4.00 | 6.00 | 6.00 | 0.0050 | 0.11 | 0.11 | 0.72 | 0.08 | Seed | 4.02 | 5 | 0.030 | 11.87 | 0.70 | 0.03 | 0.32 | 0.10 | 5.19 |
| | | | | | | | | | | | | Seed | 4.65 | 10 | 0.040 | 12.21 | 0.60 | 0.04 | 0.37 | 0.13 | 5.55 |
| 3330+00 | 3331+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0325 | 0.13 | 0.24 | 0.72 | 0.17 | Seed | 3.89 | 5 | 0.030 | 12.82 | 1.76 | 0.19 | 0.67 | 0.09 | 4.37 |
| | | | | | | | | | | | | Seed | 4.47 | 10 | 0.040 | 13.28 | 1.54 | 0.24 | 0.77 | 0.12 | 4.47 |
| 3331+00 | 3332+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0125 | 0.37 | 0.61 | 0.75 | 0.45 | Seed | 3.77 | 5 | 0.030 | 13.72 | 1.82 | 0.16 | 1.70 | 0.21 | 4.84 |
| | | | | | | | | | | | | Seed | 4.30 | 10 | 0.040 | 14.31 | 1.58 | 0.21 | 1.94 | 0.27 | 5.08 |
| 3332+00 | 3333+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0325 | 0.25 | 0.86 | 0.72 | 0.63 | Seed | 3.70 | 5 | 0.030 | 14.32 | 2.77 | 0.39 | 2.33 | 0.19 | 4.77 |
| | | | | | | | | | | | | Seed | 4.20 | 10 | 0.040 | 15.00 | 2.41 | 0.50 | 2.65 | 0.24 | 4.98 |

Flows to Rt. side Ditch

# DITCH ANALYSIS

**PID :** 101402 **Date :** 04/03/2019 **Project :** SUM-76/77 Central Int **Location :** Ramp N

**Description :**3324+25to 3328+75 Right

**Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3324+25 | 3325+25 | R | 100.00 | 0.00 | 6.00 | 6.00 | 0.0275 | 0.17 | 0.17 | 0.82 | 0.14 | Seed | 4.10 | 5 | 0.030 | 11.76 | 1.87 | 0.39 | 0.57 | 0.23 | 2.71 |
| | | | | | | | | | | | | Seed | 4.59 | 10 | 0.040 | 11.93 | 1.57 | 0.45 | 0.64 | 0.26 | 3.13 |
| 3325+25 | 3326+25 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0321 | 0.15 | 0.32 | 0.82 | 0.26 | Seed | 3.98 | 5 | 0.030 | 12.57 | 2.06 | 0.24 | 1.04 | 0.12 | 4.48 |
| | | | | | | | | | | | | Seed | 4.44 | 10 | 0.040 | 12.85 | 1.78 | 0.30 | 1.17 | 0.15 | 4.61 |
| 3326+25 | 3327+25 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0260 | 0.20 | 0.52 | 0.82 | 0.43 | Seed | 3.88 | 5 | 0.030 | 13.29 | 2.28 | 0.27 | 1.65 | 0.17 | 4.67 |
| | | | | | | | | | | | | Seed | 4.31 | 10 | 0.040 | 13.68 | 1.97 | 0.34 | 1.84 | 0.21 | 4.84 |
| 3327+25 | 3328+25 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0210 | 0.23 | 0.75 | 0.82 | 0.62 | Seed | 3.78 | 5 | 0.030 | 13.98 | 2.41 | 0.29 | 2.33 | 0.22 | 4.87 |
| | | | | | | | | | | | | Seed | 4.20 | 10 | 0.040 | 14.48 | 2.07 | 0.36 | 2.58 | 0.27 | 5.10 |
| 3328+25 | 3328+75 | R | 50.00 | 4.00 | 2.00 | 2.00 | 0.0072 | 0.25 | 1.00 | 0.82 | 0.82 | Seed | 3.72 | 5 | 0.030 | 14.42 | 1.86 | 0.16 | 3.05 | 0.35 | 5.40 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.00 | 1.59 | 0.20 | 3.39 | 0.44 | 5.75 |

# DITCH ANALYSIS

**PID :** 101402 **Date :** 04/03/2019 **Project :** SUM-76/77 Central Int **Location :** Ramp N

**Description :** 3330+75 to 3328+75 Right **Designer :** KEH

**Rainfall Area :** A

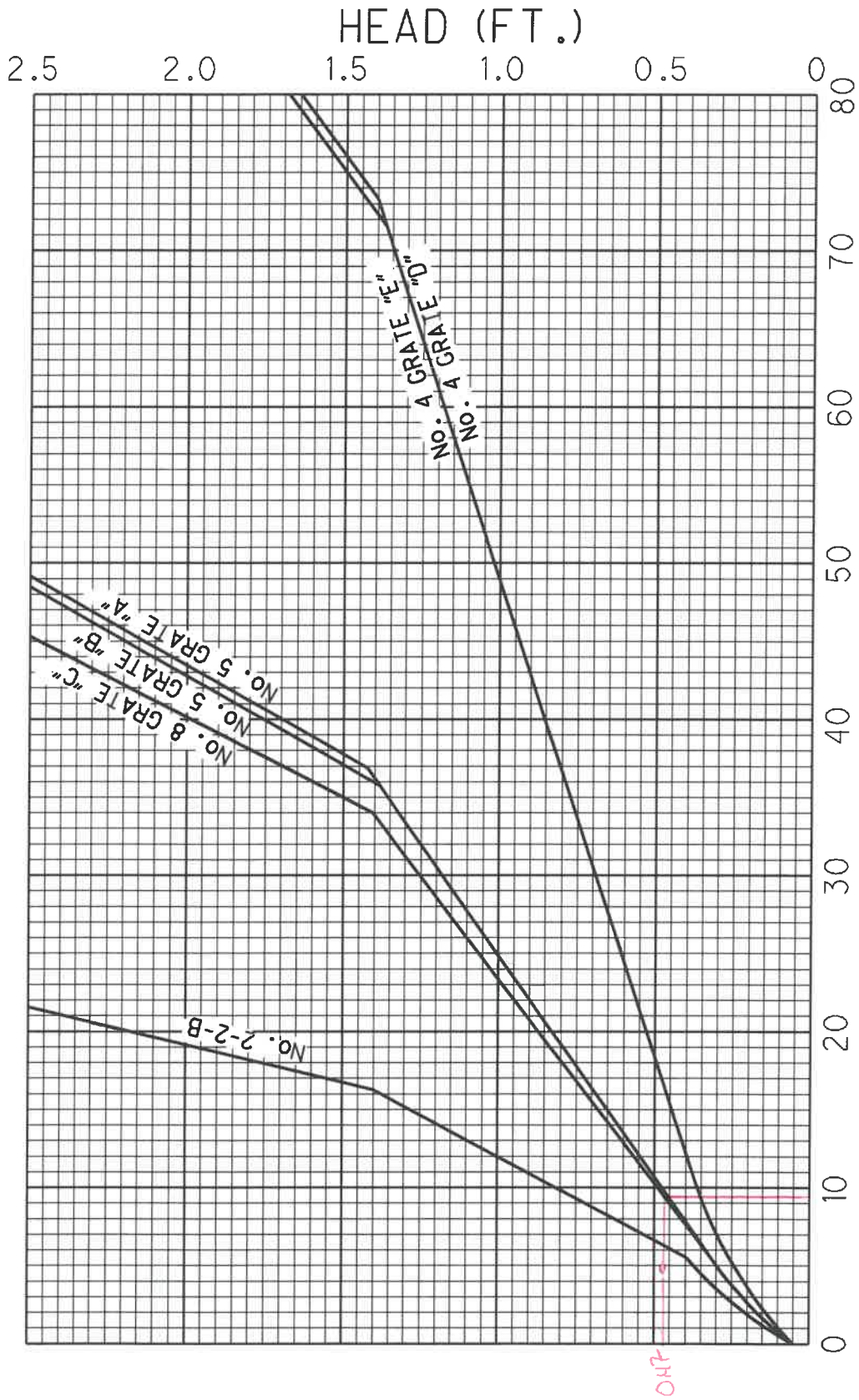
**Allowable Shears**

| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3330+75 | 3329+75 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0091 | 0.22 | 0.22 | 0.79 | 0.17 | Seed | 3.82 | 5 | 0.030 | 13.73 | 1.17 | 0.08 | 0.66 | 0.13 | 4.53 |
| | | | | | | | | | | | | Seed | 4.28 | 10 | 0.040 | 13.94 | 1.01 | 0.10 | 0.74 | 0.17 | 4.68 |
| 3329+75 | 3328+75 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0180 | 0.18 | 0.40 | 0.79 | 0.32 | Seed | 3.70 | 5 | 0.030 | 14.65 | 1.79 | 0.17 | 1.17 | 0.15 | 4.61 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.00 | 1.55 | 0.22 | 1.30 | 0.19 | 4.77 |

| CAPACITY OF A GRATE CATCH BASIN IN A SUMP | 1102-1 |
|---|---|
| | **REFERENCE SECTION** 1102.3.5 |




$Q_{10} = 3.39 + 1.30 = 4.69 \times 2 = 9.4 \Rightarrow$ Depth $= 0.47 < 0.5'$ ∴ okay

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

# DITCH ANALYSIS

**PID :** 101402 **Date :** 04/03/2019 **Project :** SUM-76/77 Central Int **Location :** Ramp N

**Description :**3332+50 to 3330+75 Right **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

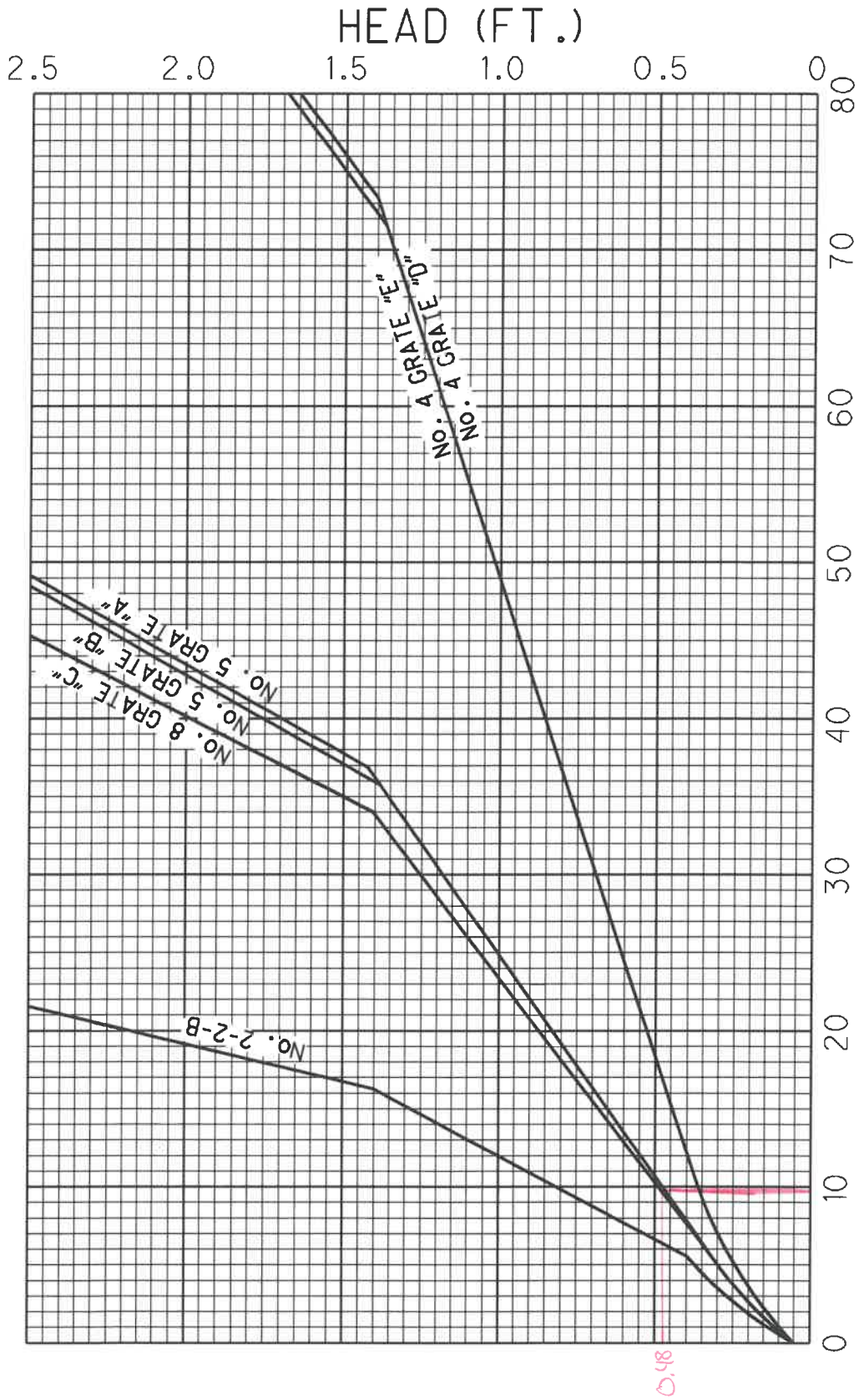
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| **RCP** | | **Type B:** | 6.00 | | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3332+50 | 3332+00 | R | 50.00 | 4.00 | 2.00 | 2.00 | 0.0040 | 1.28 | 1.28 | 0.73 | 0.93 | Seed | 3.79 | 5 | 0.030 | 13.90 | 1.61 | 0.11 | 3.54 | 0.45 | 5.80 |
| | | | | | | | | | | | | Seed | 4.27 | 10 | 0.040 | 13.99 | 1.37 | 0.14 | 3.99 | 0.57 | 6.27 |
| 3332+00 | 3331+25 | R | 95.00 | 4.00 | 2.00 | 2.00 | 0.0184 | 0.17 | 1.45 | 0.77 | 1.07 | Seed | 3.72 | 5 | 0.030 | 14.47 | 2.78 | 0.36 | 3.96 | 0.31 | 5.24 |
| | | | | | | | | | | | | Seed | 4.18 | 10 | 0.040 | 14.65 | 2.38 | 0.45 | 4.45 | 0.39 | 5.56 |
| 3331+25 | 3330+75 | R | 50.00 | 4.00 | 2.00 | 2.00 | 0.0166 | 0.14 | 1.59 | 0.77 | 1.17 | Seed | 3.68 | 5 | 0.030 | 14.77 | 2.76 | 0.35 | 4.32 | 0.34 | 5.34 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.00 | 2.36 | 0.44 | 4.84 | 0.42 | 5.69 |

| CAPACITY OF A GRATE CATCH BASIN IN A SUMP | 1102-1 |
|---|---|
| | **REFERENCE SECTION** 1102.3.5 |

Ramp N Sta. 3330+75




$Q_{10} = 4.84$ cfs $\times 2 = 9.7$ cfs $\Rightarrow$ Depth $= 0.48' < 0.5'$ ∴ okay

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

# DITCH ANALYSIS

**PID :** 101402 **Date :** 04/08/2019 **Project :** SUM-76/77 Central Int **Location :** Ramp N

**Description :**3342+50 to 3343+00 Right

**Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

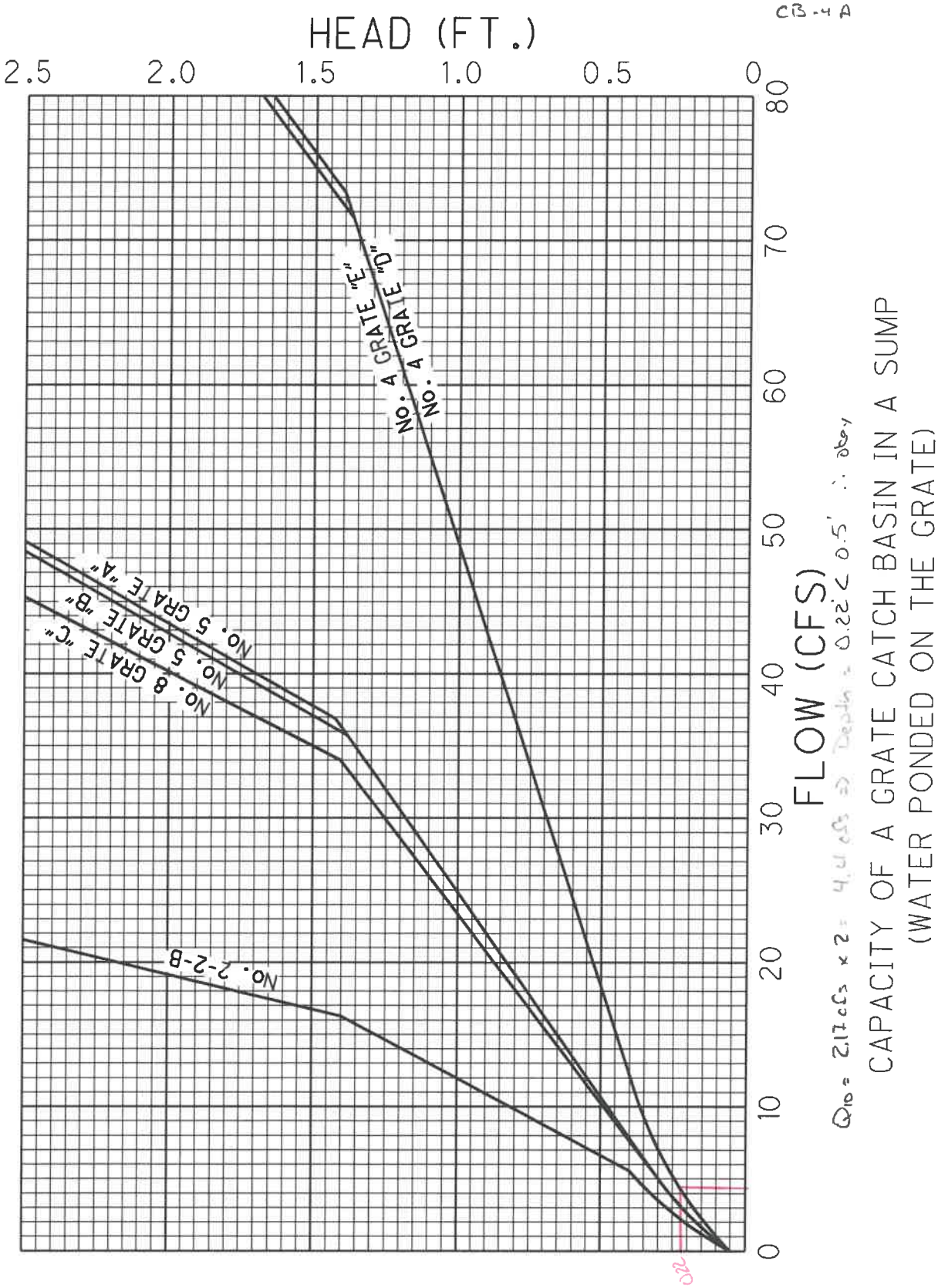
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| **RCP** | | **Type B:** | 6.00 | | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3342+00 | 3341+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0793 | 0.28 | 0.28 | 0.73 | 0.20 | Seed | 3.76 | 5 | 0.030 | 14.13 | 2.42 | 0.38 | 0.77 | 0.08 | 4.31 |
| | | | | | | | | | | | | Seed | 4.24 | 10 | 0.040 | 14.22 | 2.14 | 0.48 | 0.87 | 0.10 | 4.39 |
| 3341+00 | 3340+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0847 | 0.34 | 0.62 | 0.73 | 0.45 | Seed | 3.70 | 5 | 0.030 | 14.62 | 3.32 | 0.63 | 1.67 | 0.12 | 4.48 |
| | | | | | | | | | | | | Jute Mat | 3.69 | 5 | 0.040 | 14.73 | 2.78 | 0.74 | 1.67 | 0.14 | 4.56 |
| | | | | | | | | | | | | Temp. Mat | 3.69 | 5 | 0.040 | 14.73 | 2.78 | 0.74 | 1.67 | 0.14 | 4.56 |
| | | | | | | | | | | | | Temp. Mat | 4.16 | 10 | 0.040 | 14.79 | 2.90 | 0.80 | 1.88 | 0.15 | 4.60 |
| 3340+00 | 3339+60 | R | 40.00 | 4.00 | 2.00 | 2.00 | 0.0998 | 0.10 | 0.72 | 0.73 | 0.53 | Seed | 3.66 | 5 | 0.030 | 14.91 | 3.69 | 0.76 | 1.93 | 0.12 | 4.49 |
| | | | | | | | | | | | | Jute Mat | 3.66 | 5 | 0.040 | 14.94 | 3.08 | 0.91 | 1.92 | 0.15 | 4.58 |
| | | | | | | | | | | | | Temp. Mat | 3.66 | 5 | 0.040 | 14.94 | 3.08 | 0.91 | 1.92 | 0.15 | 4.58 |
| | | | | | | | | | | | | Temp. Mat | 4.13 | 10 | 0.040 | 15.00 | 3.22 | 0.97 | 2.17 | 0.16 | 4.63 |

| CAPACITY OF A GRATE CATCH BASIN IN A SUMP | 1102-1 |
|---|---|
| | **REFERENCE SECTION** 1102.3.5 |

Ramp N Sta. 3339+60 RT
CB-4 A




$Q_{10} = 2.12\,cfs \times 2 = 4.24\,cfs \Rightarrow$ Depth = 0.22' < 0.5' ∴ okay

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

# DITCH ANALYSIS

**PID :** 101402 **Date :** 04/08/2019 **Project :** SUM-76/77 Central Int **Location :** Ramp N

**Description :** 3342+50 to 3343+00 Right **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3342+50 | 3343+00 | R | 50.00 | 4.00 | 4.00 | 4.00 | 0.0274 | 0.35 | 0.35 | 0.70 | 0.25 | Seed | 3.66 | 5 | 0.030 | 14.93 | 1.79 | 0.19 | 0.90 | 0.11 | 4.90 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.00 | 1.56 | 0.24 | 1.01 | 0.14 | 5.14 |

# DITCH ANALYSIS

**PID :** 101402 **Date :** 04/08/2019 **Project :** SUM-76/77 Central Int **Location :** Ramp N

**Description :** 3349+00 to 3343+00 Right

**Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

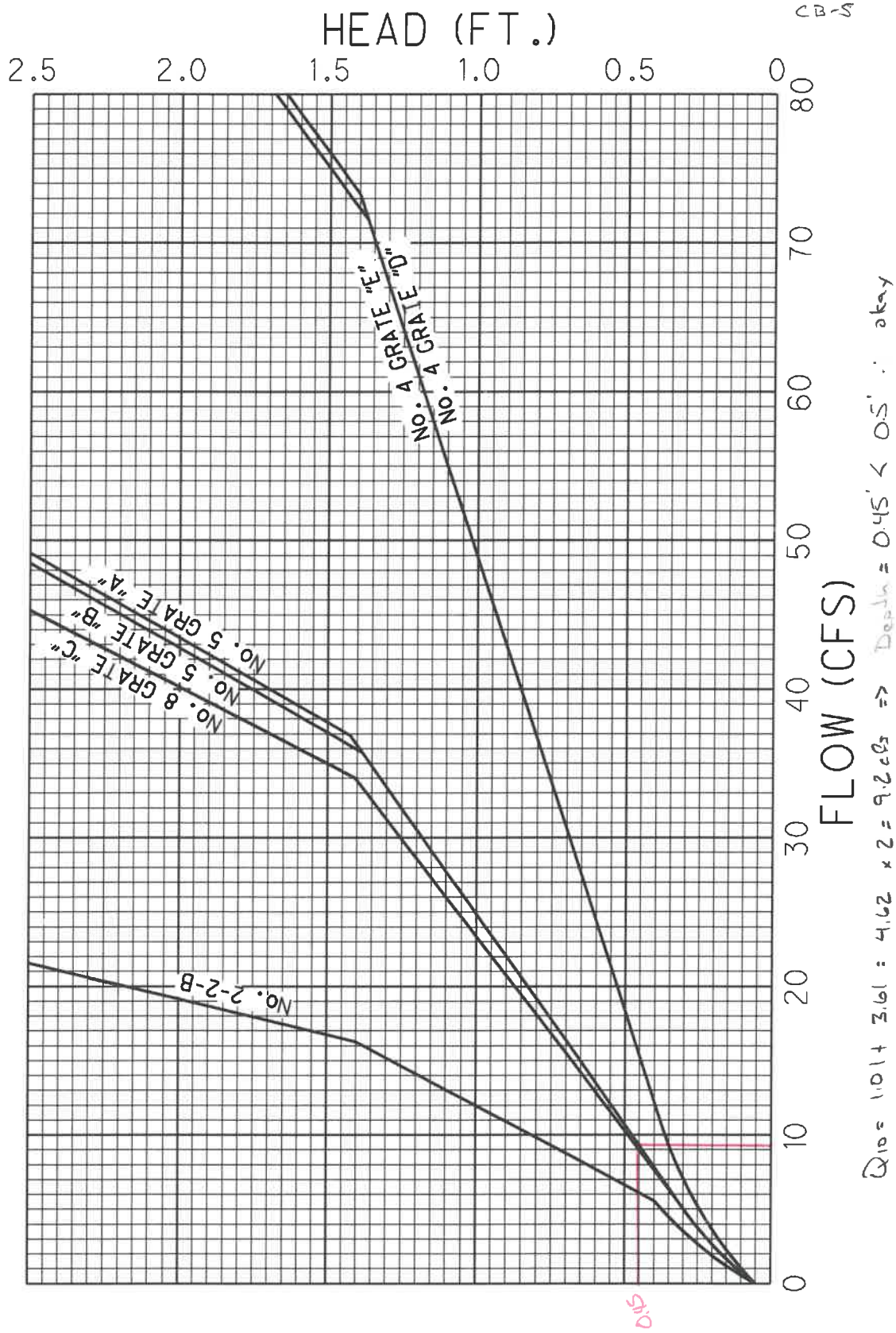
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3349+00 | 3348+00 | R | 100.00 | 4.00 | 4.00 | 4.00 | 0.0186 | 0.17 | 0.17 | 0.70 | 0.12 | Seed | 4.39 | 5 | 0.030 | 10.11 | 1.31 | 0.11 | 0.52 | 0.09 | 4.73 |
| | | | | | | | | | | | | Seed | 4.88 | 10 | 0.040 | 10.33 | 1.13 | 0.13 | 0.58 | 0.12 | 4.92 |
| 3348+00 | 3347+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0238 | 0.18 | 0.35 | 0.70 | 0.25 | Seed | 4.23 | 5 | 0.030 | 10.99 | 1.87 | 0.19 | 1.04 | 0.13 | 4.52 |
| | | | | | | | | | | | | Seed | 4.69 | 10 | 0.040 | 11.34 | 1.62 | 0.24 | 1.15 | 0.16 | 4.66 |
| 3347+00 | 3346+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0252 | 0.18 | 0.53 | 0.70 | 0.37 | Seed | 4.11 | 5 | 0.030 | 11.74 | 2.19 | 0.25 | 1.52 | 0.16 | 4.64 |
| | | | | | | | | | | | | Seed | 4.54 | 10 | 0.040 | 12.22 | 1.89 | 0.32 | 1.69 | 0.20 | 4.81 |
| 3346+00 | 3345+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0114 | 0.21 | 0.74 | 0.70 | 0.52 | Seed | 3.97 | 5 | 0.030 | 12.61 | 1.89 | 0.17 | 2.06 | 0.24 | 4.97 |
| | | | | | | | | | | | | Seed | 4.38 | 10 | 0.040 | 13.23 | 1.62 | 0.22 | 2.27 | 0.30 | 5.21 |
| 3345+00 | 3344+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0132 | 0.22 | 0.96 | 0.70 | 0.67 | Seed | 3.86 | 5 | 0.030 | 13.38 | 2.15 | 0.22 | 2.60 | 0.27 | 5.06 |
| | | | | | | | | | | | | Seed | 4.25 | 10 | 0.040 | 14.13 | 1.84 | 0.27 | 2.86 | 0.33 | 5.33 |
| 3344+00 | 3343+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0115 | 0.29 | 1.25 | 0.70 | 0.88 | Seed | 3.76 | 5 | 0.030 | 14.12 | 2.23 | 0.23 | 3.29 | 0.32 | 5.27 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.00 | 1.90 | 0.28 | 3.61 | 0.40 | 5.59 |

| CAPACITY OF A GRATE CATCH BASIN IN A SUMP | 1102-1 |
|---|---|
| | **REFERENCE SECTION** 1102.3.5 |

Ramp N Sta. 3343+00 RT
CB-5




$Q_{100} = 1.01 + 3.61 = 4.62 \times 2 = 9.2$ cfs => Depth = 0.45' < 0.5' ∴ okay

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

DKS

# DITCH ANALYSIS

**PID :** 101402 **Date :** 03/06/2019 **Project :** SUM-76/77 Central Int **Location :** Central Interchange

**Description :** Ramp O Sta. 8311+00 to 8313+20 Right **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8311+00 | 8312+00 | R | 100.00 | 2.00 | 4.00 | 4.00 | 0.0025 | 0.12 | 0.12 | 0.63 | 0.08 | Seed | 4.00 | 5 | 0.030 | 12.45 | 0.65 | 0.03 | 0.30 | 0.17 | 3.38 |
| | | | | | | | | | | | | Seed | 4.44 | 10 | 0.040 | 12.87 | 0.55 | 0.03 | 0.34 | 0.21 | 3.72 |
| 8312+00 | 8313+20 | R | 120.00 | 4.00 | 4.00 | 4.00 | 0.0065 | 0.21 | 0.33 | 0.63 | 0.21 | Seed | 3.74 | 5 | 0.030 | 14.28 | 1.06 | 0.06 | 0.78 | 0.16 | 5.27 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.00 | 0.92 | 0.08 | 0.86 | 0.20 | 5.57 |

# DITCH ANALYSIS

**PID :** 101402 **Date :** 03/06/2019 **Project :** SUM-76/77 Central Int **Location :** Central Interchange

**Description :** Ramp O Sta. 8316+50 to 8313+20 Right **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

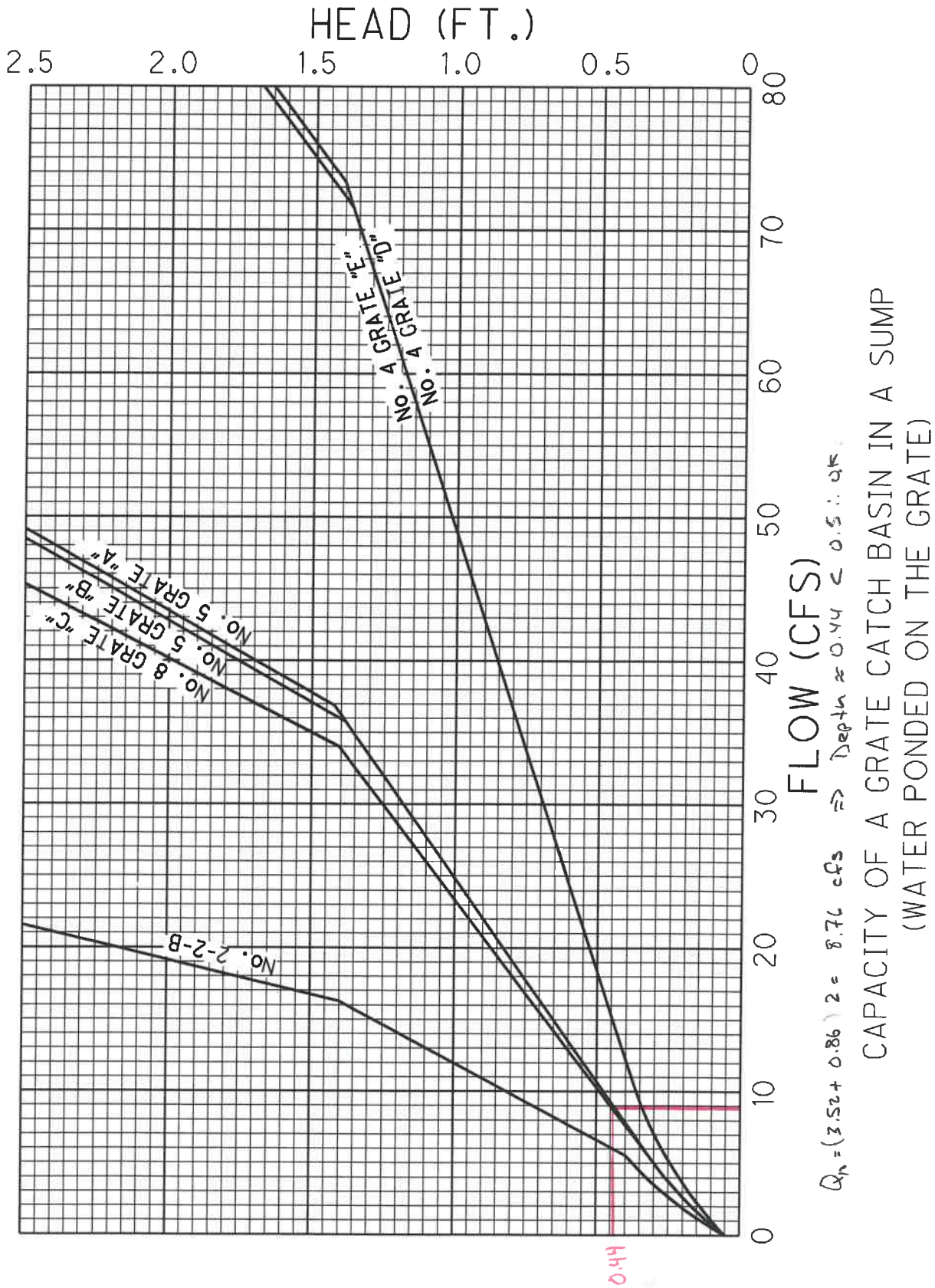
| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8316+50 | 8315+50 | R | 100.00 | 4.00 | 4.00 | 4.00 | 0.0055 | 0.43 | 0.43 | 0.52 | 0.22 | Seed | 3.54 | 5 | 0.030 | 15.91 | 1.02 | 0.06 | 0.79 | 0.17 | 5.33 |
| | | | | | | | | | | | | Seed | 3.98 | 10 | 0.040 | 16.17 | 0.88 | 0.07 | 0.89 | 0.21 | 5.68 |
| 8315+50 | 8314+50 | R | 100.00 | 4.00 | 4.00 | 4.00 | 0.0056 | 0.39 | 0.82 | 0.52 | 0.43 | Seed | 3.40 | 5 | 0.030 | 17.22 | 1.25 | 0.08 | 1.45 | 0.23 | 5.88 |
| | | | | | | | | | | | | Seed | 3.80 | 10 | 0.040 | 17.71 | 1.06 | 0.10 | 1.62 | 0.29 | 6.35 |
| 8314+50 | 8313+50 | R | 100.00 | 4.00 | 4.00 | 4.00 | 0.0121 | 0.94 | 1.76 | 0.52 | 0.92 | Seed | 3.32 | 5 | 0.030 | 18.03 | 2.06 | 0.22 | 3.03 | 0.29 | 6.29 |
| | | | | | | | | | | | | Seed | 3.70 | 10 | 0.040 | 18.65 | 1.74 | 0.27 | 3.38 | 0.36 | 6.86 |
| 8313+50 | 8313+20 | R | 30.00 | 4.00 | 4.00 | 4.00 | 0.0270 | 0.08 | 1.84 | 0.52 | 0.96 | Seed | 3.30 | 5 | 0.030 | 18.21 | 2.74 | 0.39 | 3.16 | 0.23 | 5.87 |
| | | | | | | | | | | | | Seed | 3.67 | 10 | 0.040 | 18.87 | 2.33 | 0.49 | 3.52 | 0.29 | 6.34 |

| CAPACITY OF A GRATE CATCH BASIN IN A SUMP | 1102-1 |
|---|---|
| | **REFERENCE SECTION** 1102.3.5 |

Ex. CB-5 Ramp O Sta. 8313+20 RT




$Q_n = (3.52 + 0.86)\,2 = 8.76$ cfs ⇒ Depth ≈ 0.44 < 0.5 ∴ ok

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

# DITCH ANALYSIS

**PID :** 101402 **Date :** 03/07/2019 **Project :** SUM-76/77 Central Int **Location :** Central Interchange

**Description :** Ramp O Sta. 8311+00 to 8312+08 Left **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8311+00 | 8312+08 | L | 108.00 | 4.00 | 4.00 | 4.00 | 0.0088 | 0.15 | 0.15 | 0.73 | 0.11 | Seed | 3.69 | 5 | 0.030 | 14.73 | 0.92 | 0.05 | 0.40 | 0.10 | 4.79 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.00 | 0.81 | 0.07 | 0.45 | 0.12 | 4.99 |

# DITCH ANALYSIS

**PID :** 101402 **Date :** 03/07/2019 **Project :** SUM-76/77 Central Int **Location :** Central Interchange

**Description :** Ramp O Sta. 8314+00 to 8312+08 Left **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

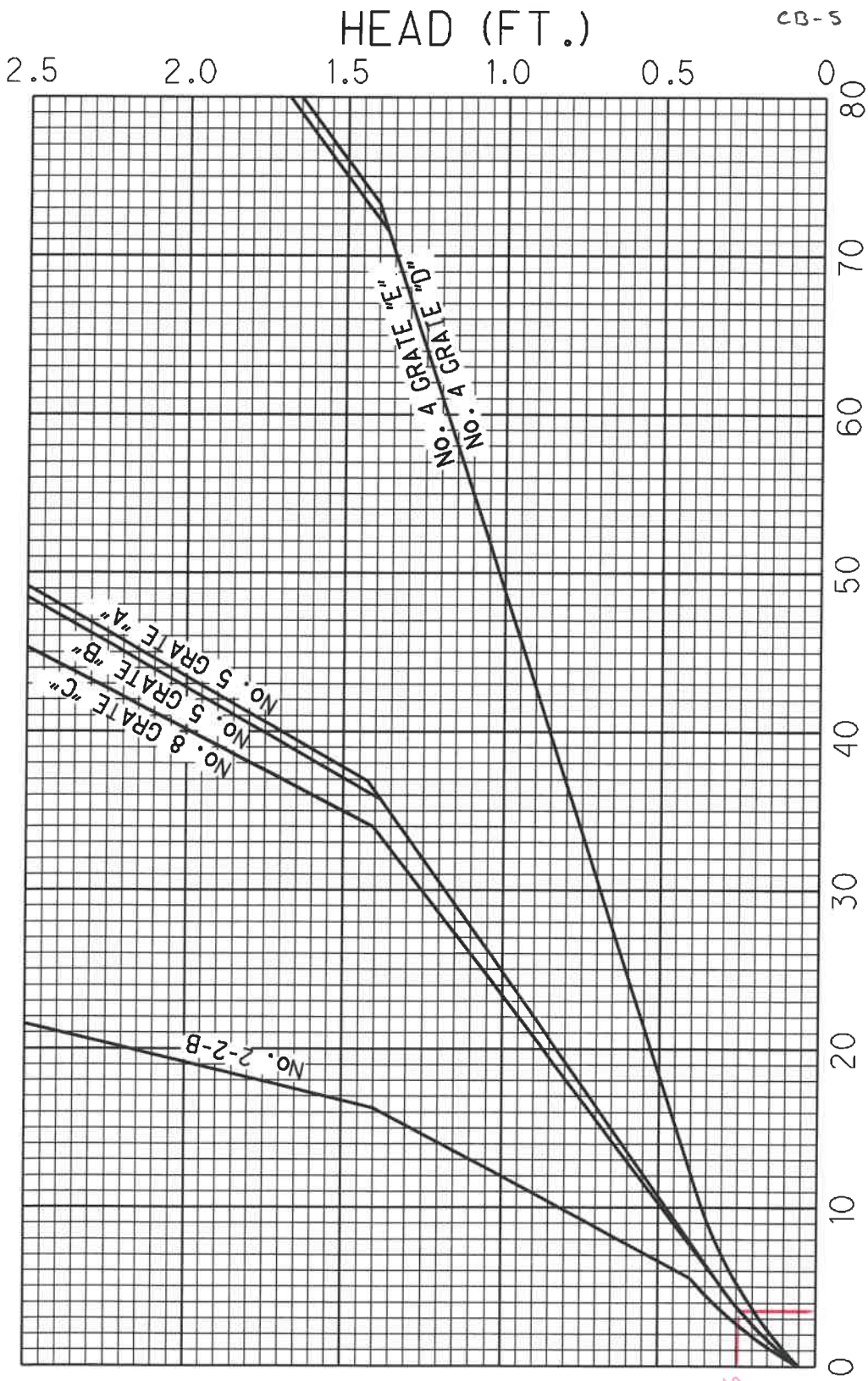
(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8314+00 | 8313+00 | L | 100.00 | 4.00 | 4.00 | 4.00 | 0.0041 | 0.25 | 0.25 | 0.75 | 0.19 | Seed | 3.87 | 5 | 0.030 | 13.33 | 0.90 | 0.04 | 0.73 | 0.17 | 5.38 |
| | | | | | | | | | | | | Seed | 4.32 | 10 | 0.040 | 13.62 | 0.77 | 0.06 | 0.81 | 0.22 | 5.74 |
| 8313+00 | 8312+08 | L | 92.00 | 4.00 | 4.00 | 4.00 | 0.0073 | 0.18 | 0.43 | 0.75 | 0.32 | Seed | 3.71 | 5 | 0.030 | 14.51 | 1.28 | 0.09 | 1.20 | 0.20 | 5.57 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.00 | 1.09 | 0.11 | 1.33 | 0.24 | 5.96 |

| CAPACITY OF A GRATE CATCH BASIN IN A SUMP | 1102-1 |
|---|---|
| | **REFERENCE SECTION** 1102.3.5 |

Ramp O Sta. 8312+08 LT

CB-5




$Q_n = 0.45 + 1.33 = 1.78$ cfs < 3.6 cfs ⇒ Depth = 0.25 < 0.5' O.K.

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

# DITCH ANALYSIS

**PID :** 101402 **Date :** 03/07/2019 **Project :** SUM-76/77 Central Int **Location :** Central Interchange

**Description :**Ramp O Sta. 8316+50 to 8314+40 Left **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

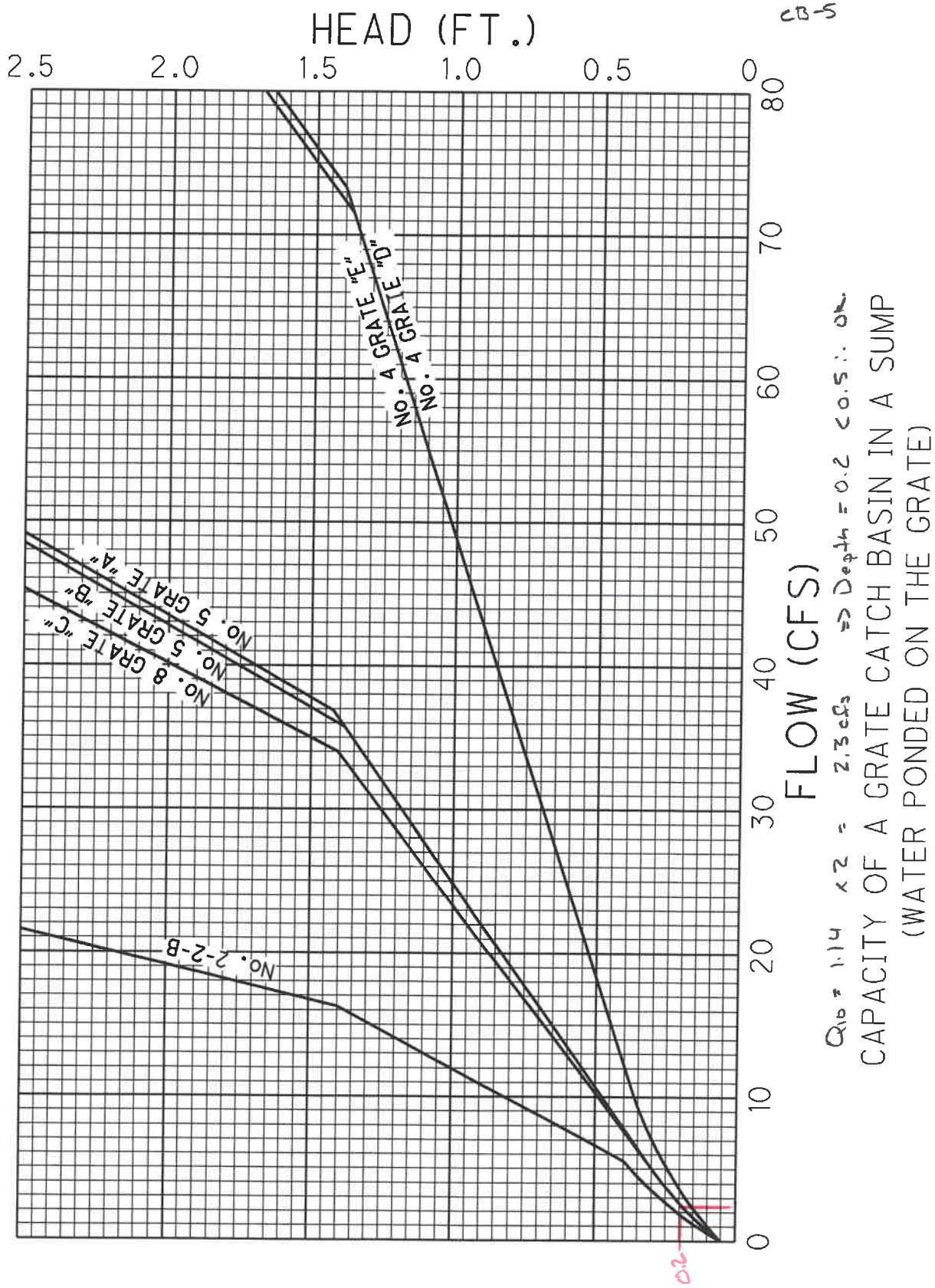
(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8316+50 | 8315+50 | L | 100.00 | 4.00 | 4.00 | 4.00 | 0.0168 | 0.16 | 0.16 | 0.77 | 0.12 | Seed | 3.82 | 5 | 0.030 | 13.72 | 1.22 | 0.09 | 0.47 | 0.09 | 4.71 |
| | | | | | | | | | | | | Seed | 4.28 | 10 | 0.040 | 13.92 | 1.05 | 0.12 | 0.53 | 0.11 | 4.90 |
| 8315+50 | 8314+40 | L | 110.00 | 4.00 | 4.00 | 4.00 | 0.0309 | 0.20 | 0.36 | 0.77 | 0.28 | Seed | 3.70 | 5 | 0.030 | 14.65 | 1.94 | 0.23 | 1.02 | 0.12 | 4.95 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.00 | 1.69 | 0.28 | 1.14 | 0.15 | 5.18 |

| CAPACITY OF A GRATE CATCH BASIN IN A SUMP | 1102-1 |
|---|---|
| | **REFERENCE SECTION** 1102.3.5 |

Ramp D Sta. 8314+40 LT

CB-5




$Q_{10} = 1.14 \times 2 = 2.3$ cfs ⇒ Depth = 0.2 < 0.5 ∴ ok.

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

# DITCH ANALYSIS

**PID :** 101402 **Date :** 03/07/2019 **Project :** SUM-76/77 Central Int **Location :** Central Interchange

**Description :** Ramp O Sta. 8322+50 to 8320+50 Left **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8322+50 | 8322+00 | L | 50.00 | 0.00 | 24.00 | 1.00 | 0.0032 | 0.09 | 0.09 | 0.76 | 0.07 | Seed | 4.03 | 5 | 0.030 | 12.25 | 0.59 | 0.04 | 0.28 | 0.19 | 4.83 |
| | | | | | | | | | | | | Seed | 4.49 | 10 | 0.040 | 12.53 | 0.48 | 0.05 | 0.31 | 0.23 | 5.64 |
| 8322+00 | 8321+00 | L | 100.00 | 2.00 | 4.00 | 2.00 | 0.0077 | 0.10 | 0.19 | 0.76 | 0.14 | Seed | 3.83 | 5 | 0.030 | 13.61 | 1.21 | 0.09 | 0.55 | 0.18 | 3.08 |
| | | | | | | | | | | | | Seed | 4.25 | 10 | 0.040 | 14.13 | 1.02 | 0.11 | 0.61 | 0.23 | 3.35 |
| 8321+00 | 8320+50 | L | 50.00 | 2.00 | 4.00 | 2.00 | 0.0054 | 0.04 | 0.23 | 0.76 | 0.17 | Seed | 3.74 | 5 | 0.030 | 14.33 | 1.11 | 0.07 | 0.65 | 0.22 | 3.32 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.00 | 0.95 | 0.09 | 0.72 | 0.27 | 3.63 |

Meet Existing

# DITCH ANALYSIS

**PID :** 101402 **Date :** 03/07/2019 **Project :** SUM-76/77 Central Int **Location :** Central Interchange

**Description :** Ramp O Sta. 8322+50 to 8323+87 Left **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

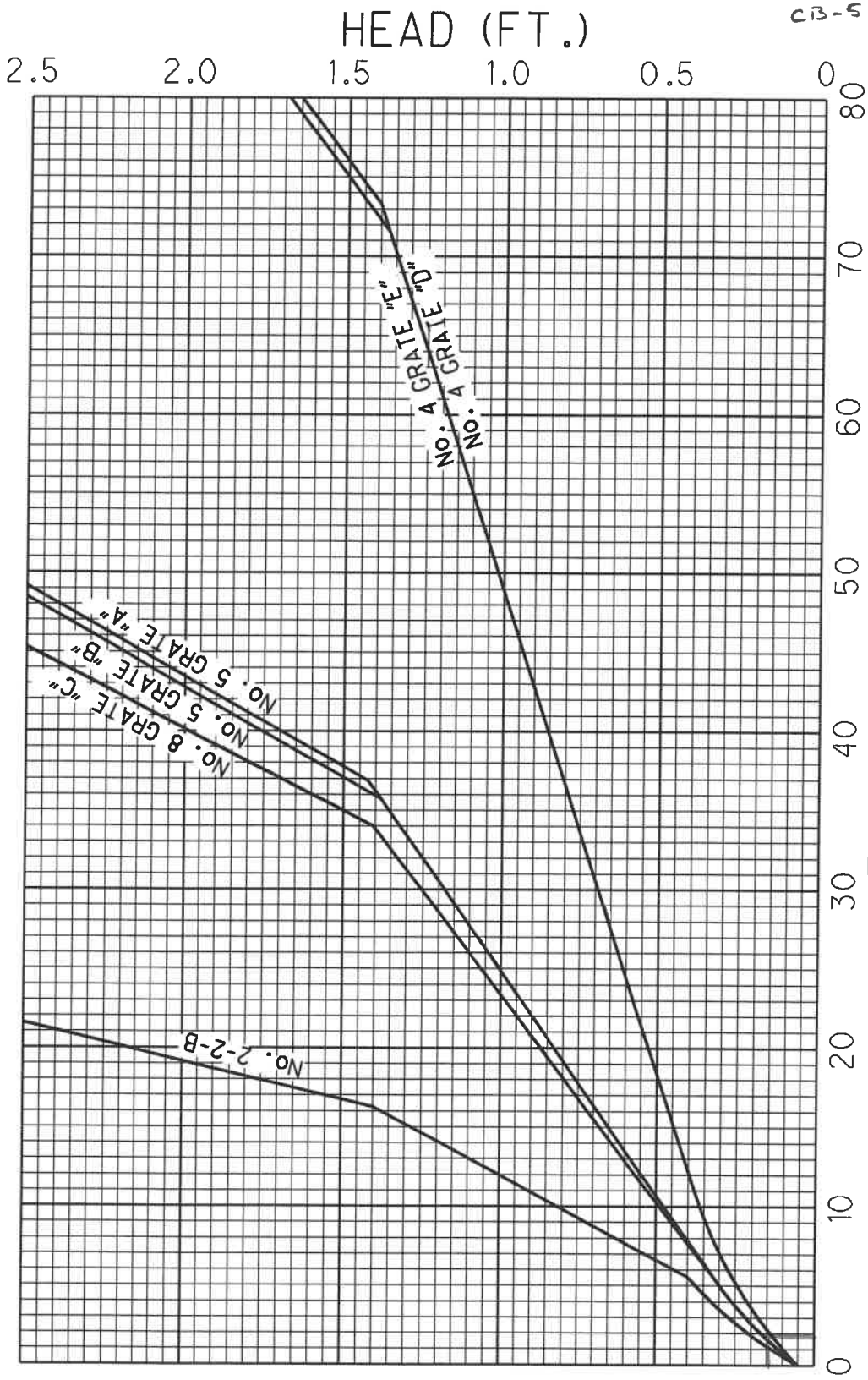
| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8322+50 | 8323+00 | L | 50.00 | 2.00 | 2.00 | 2.00 | 0.0026 | 0.09 | 0.09 | 0.74 | 0.07 | Seed | 3.88 | 5 | 0.030 | 13.26 | 0.69 | 0.03 | 0.26 | 0.16 | 2.64 |
| | | | | | | | | | | | | Seed | 4.34 | 10 | 0.040 | 13.49 | 0.59 | 0.03 | 0.29 | 0.20 | 2.82 |
| 8323+00 | 8323+87 | L | 87.00 | 2.00 | 2.00 | 2.00 | 0.0037 | 0.22 | 0.31 | 0.74 | 0.23 | Seed | 3.71 | 5 | 0.030 | 14.54 | 1.12 | 0.07 | 0.85 | 0.29 | 3.17 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.00 | 0.95 | 0.08 | 0.95 | 0.37 | 3.46 |

| CAPACITY OF A GRATE CATCH BASIN IN A SUMP | 1102-1 |
|---|---|
| | **REFERENCE SECTION** 1102.3.5 |

Ramp O Sta. 8323+87 LT
CB-5




$Q_{10} = 0.95 \times 2 = 1.9\ cfs \Rightarrow Depth = 0.13 < 0.5 \therefore OK$

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

0.15

# DITCH ANALYSIS

**PID :** 101402 **Date :** 04/04/2019 **Project :** SUM-76/77 Central Int **Location :** Ramp T

**Description :** 7319+00 TO 7316+00 Left **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7319+00 | 7318+00 | L | 100.00 | 4.00 | 4.00 | 4.00 | 0.0505 | 0.07 | 0.07 | 0.52 | 0.04 | Seed | 4.02 | 5 | 0.030 | 12.33 | 1.10 | 0.10 | 0.15 | 0.03 | 4.26 |
| | | | | | | | | | | | | Seed | 4.48 | 10 | 0.040 | 12.61 | 0.97 | 0.13 | 0.16 | 0.04 | 4.32 |
| 7318+00 | 7317+00 | L | 100.00 | 4.00 | 4.00 | 4.00 | 0.0400 | 0.11 | 0.18 | 0.52 | 0.09 | Seed | 3.85 | 5 | 0.030 | 13.47 | 1.44 | 0.15 | 0.36 | 0.06 | 4.47 |
| | | | | | | | | | | | | Seed | 4.28 | 10 | 0.040 | 13.93 | 1.24 | 0.19 | 0.40 | 0.08 | 4.60 |
| 7317+00 | 7316+00 | L | 100.00 | 4.00 | 4.00 | 4.00 | 0.0356 | 0.18 | 0.36 | 0.52 | 0.19 | Seed | 3.73 | 5 | 0.030 | 14.39 | 1.78 | 0.20 | 0.70 | 0.09 | 4.72 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.00 | 1.54 | 0.25 | 0.77 | 0.11 | 4.90 |

# DITCH ANALYSIS

**PID :** 101402 **Date :** 04/03/2019 **Project :** SUM-76/77 Central Int **Location :** Ramp T

**Description :**7320+50TO 7319+50 Left **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7320+50 | 7319+50 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0514 | 0.22 | 0.22 | 0.81 | 0.18 | Seed | 3.66 | 5 | 0.030 | 14.89 | 2.02 | 0.25 | 0.65 | 0.08 | 4.31 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.00 | 1.74 | 0.32 | 0.74 | 0.10 | 4.40 |

# DITCH ANALYSIS

**PID :** 101402 **Date :** 04/03/2019 **Project :** SUM-76/77 Central Int **Location :** Ramp T

**Description :**7322+37 TO 7320+50 Left **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

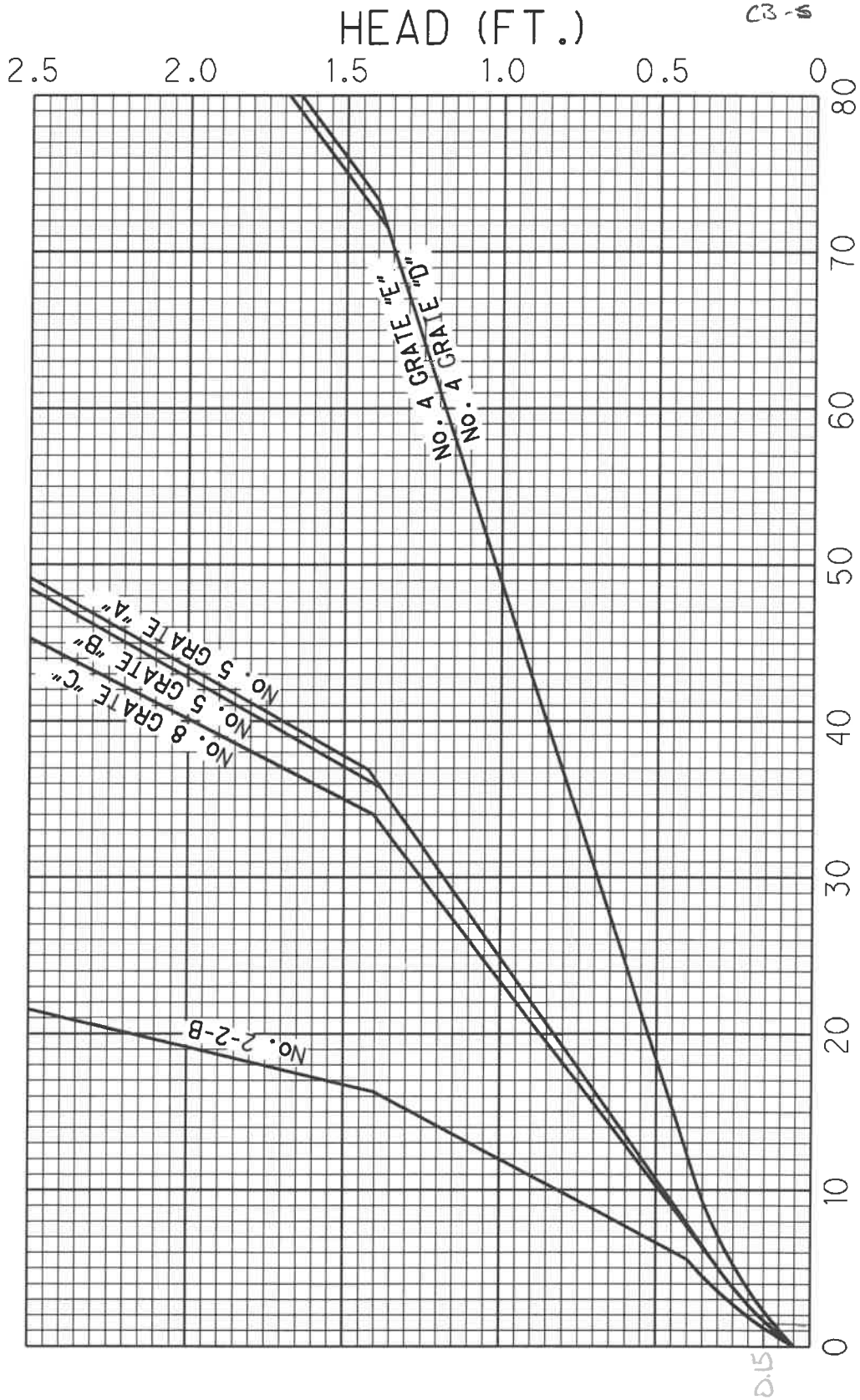
(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7322+37 | 7321+50 | L | 87.00 | 4.00 | 2.00 | 2.00 | 0.0544 | 0.07 | 0.07 | 0.79 | 0.06 | Seed | 3.80 | 5 | 0.030 | 13.85 | 1.28 | 0.14 | 0.21 | 0.04 | 4.16 |
| | | | | | | | | | | | | Seed | 4.27 | 10 | 0.040 | 13.99 | 1.13 | 0.17 | 0.24 | 0.05 | 4.20 |
| 7321+50 | 7320+50 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0446 | 0.14 | 0.21 | 0.79 | 0.17 | Seed | 3.68 | 5 | 0.030 | 14.74 | 1.86 | 0.22 | 0.61 | 0.08 | 4.32 |
| | | | | | | | | | | | | Seed | 4.13 | 10 | 0.040 | 15.00 | 1.64 | 0.28 | 0.69 | 0.10 | 4.40 |

| CAPACITY OF A GRATE CATCH BASIN IN A SUMP | 1102-1 |
|---|---|
| | **REFERENCE SECTION** 1102.3.5 |

Ramp T 7320+50 & 7319+50 LT

C3-5




Largest $Q_{10}$ = 0.74 cfs × 2 = 1.5 cfs ⇒ Depth = 0.15' < 0.5' ∴ OK

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

0.15

# DITCH ANALYSIS

**PID :** 101402 **Date :** 10/04/2017 **Project :** SUM-76/77 Central Int **Location :** Lane U

**Description :**4540+00 to 4536+00 Left **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4540+00 | 4539+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0263 | 0.25 | 0.25 | 0.75 | 0.19 | Seed | 3.97 | 5 | 0.030 | 12.20 | 1.71 | 0.17 | 0.74 | 0.10 | 4.41 |
| | | | | | | | | | | | | Seed | 4.63 | 10 | 0.040 | 12.32 | 1.52 | 0.22 | 0.87 | 0.13 | 4.54 |
| 4539+00 | 4538+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0189 | 0.21 | 0.46 | 0.75 | 0.35 | Seed | 3.86 | 5 | 0.030 | 13.06 | 1.91 | 0.19 | 1.33 | 0.16 | 4.64 |
| | | | | | | | | | | | | Seed | 4.46 | 10 | 0.040 | 13.30 | 1.66 | 0.25 | 1.54 | 0.21 | 4.84 |
| 4538+00 | 4537+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0122 | 0.19 | 0.65 | 0.75 | 0.49 | Seed | 3.74 | 5 | 0.030 | 13.95 | 1.85 | 0.17 | 1.83 | 0.22 | 4.89 |
| | | | | | | | | | | | | Seed | 4.30 | 10 | 0.040 | 14.32 | 1.61 | 0.22 | 2.10 | 0.28 | 5.14 |
| 4537+00 | 4536+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0363 | 0.13 | 0.78 | 0.75 | 0.59 | Seed | 3.67 | 5 | 0.030 | 14.54 | 2.78 | 0.40 | 2.15 | 0.18 | 4.71 |
| | | | | | | | | | | | | Jute Mat | 3.66 | 5 | 0.040 | 14.66 | 2.31 | 0.47 | 2.14 | 0.21 | 4.84 |
| | | | | | | | | | | | | Temp. Mat | 3.66 | 5 | 0.040 | 14.66 | 2.31 | 0.47 | 2.14 | 0.21 | 4.84 |
| | | | | | | | | | | | | Temp. Mat | 4.20 | 10 | 0.040 | 15.00 | 2.43 | 0.51 | 2.46 | 0.23 | 4.91 |

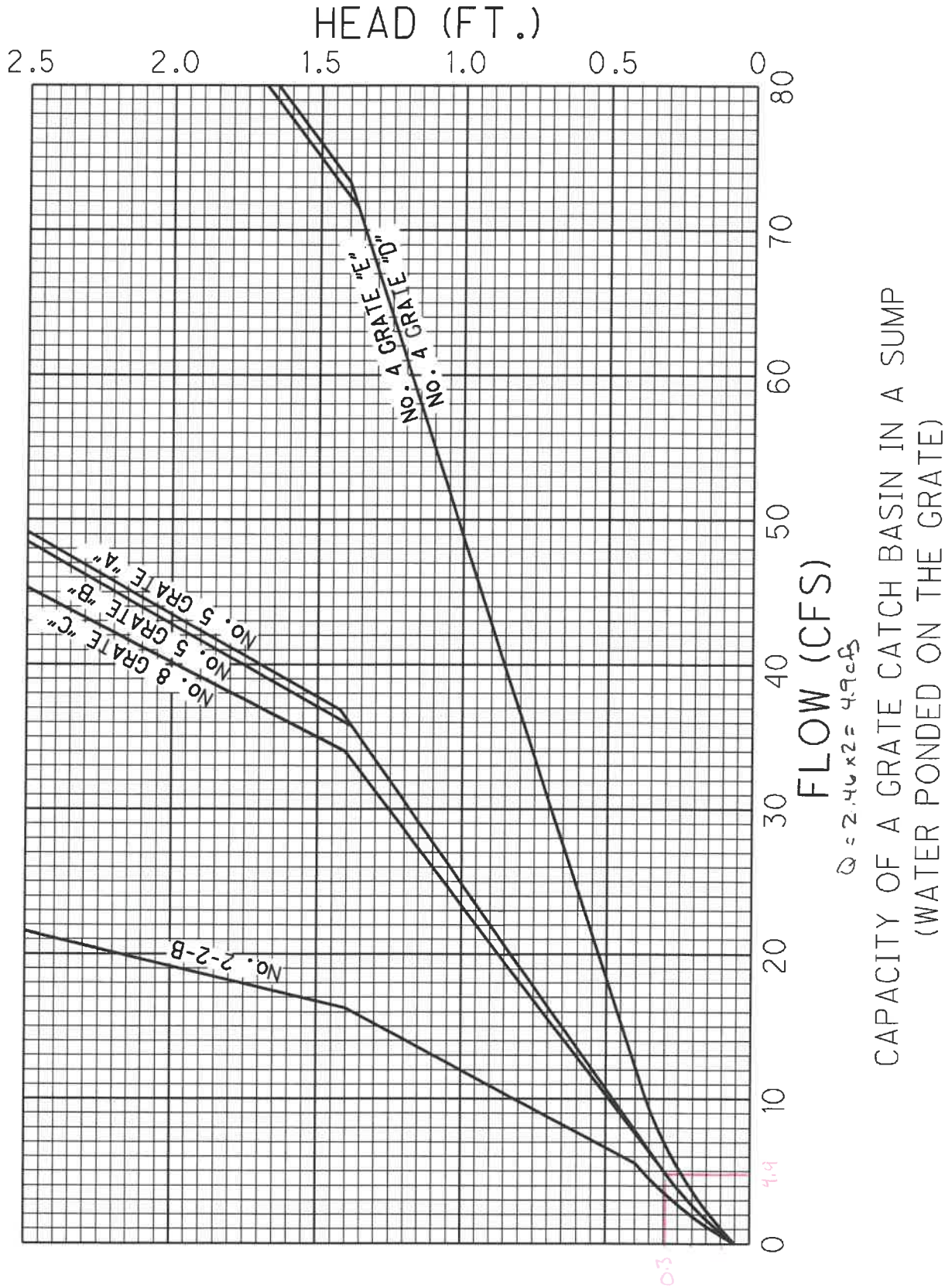
Lane U 4536+00 LT

# CAPACITY OF A GRATE CATCH BASIN IN A SUMP

1102-1

**REFERENCE SECTION**
1102.3.5

CB - 8




CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

# DITCH ANALYSIS

**PID :** 101402 **Date :** 10/04/2017 **Project :** SUM-76/77 Central Int **Location :** Lane U

**Description :**4540+00 to 4541+25 Left **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4540+00 | 4541+25 | L | 125.00 | 4.00 | 2.00 | 2.00 | 0.0126 | 0.26 | 0.26 | 0.75 | 0.20 | Seed | 3.65 | 5 | 0.030 | 14.78 | 1.32 | 0.10 | 0.71 | 0.13 | 4.50 |
| | | | | | | | | | | | | Seed | 4.20 | 10 | 0.040 | 15.00 | 1.18 | 0.13 | 0.82 | 0.16 | 4.64 |

# DITCH ANALYSIS

**PID :** 101402 **Date :** 10/04/2017 **Project :** SUM-76/77 Central Int **Location :** Lane U

**Description :**4541+25 to 4549+50 Left **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | |
|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** 5.00 |
| **RCP** | **Type B:** | 6.00 | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4549+00 | 4549+50 | L | 50.00 | 2.00 | 2.00 | 2.00 | 0.0632 | 0.30 | 0.30 | 0.79 | 0.24 | Seed | 4.34 | 5 | 0.030 | 9.76 | 3.10 | 0.57 | 1.03 | 0.15 | 2.58 |
| | | | | | | | | | | | | Jute Mat | 4.35 | 5 | 0.015 | 9.67 | 4.87 | 0.38 | 1.03 | 0.10 | 2.39 |
| | | | | | | | | | | | | Jute Mat | 5.17 | 10 | 0.015 | 9.66 | 5.19 | 0.42 | 1.23 | 0.11 | 2.43 |
| 4549+00 | 4548+00 | L | 100.00 | 2.00 | 2.00 | 2.00 | 0.0430 | 0.28 | 0.58 | 0.79 | 0.46 | Seed | 4.28 | 5 | 0.030 | 10.15 | 3.40 | 0.63 | 1.96 | 0.23 | 2.93 |
| | | | | | | | | | | | | Jute Mat | 4.30 | 5 | 0.015 | 9.97 | 5.40 | 0.42 | 1.97 | 0.16 | 2.63 |
| | | | | | | | | | | | | Jute Mat | 5.11 | 10 | 0.015 | 9.95 | 5.73 | 0.47 | 2.34 | 0.17 | 2.70 |
| 4548+00 | 4547+00 | L | 100.00 | 2.00 | 2.00 | 2.00 | 0.0737 | 0.16 | 0.74 | 0.79 | 0.58 | Seed | 4.24 | 5 | 0.030 | 10.35 | 4.39 | 1.06 | 2.48 | 0.23 | 2.92 |
| | | | | | | | | | | | | Jute Mat | 4.27 | 5 | 0.015 | 10.21 | 7.00 | 0.71 | 2.49 | 0.15 | 2.62 |
| | | | | | | | | | | | | Temp. Mat | 4.27 | 5 | 0.015 | 10.21 | 7.00 | 0.71 | 2.49 | 0.15 | 2.62 |
| | | | | | | | | | | | | Temp. Mat | 5.06 | 10 | 0.015 | 10.17 | 7.41 | 0.78 | 2.96 | 0.17 | 2.68 |
| 4547+00 | 4546+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0047 | 0.12 | 0.86 | 0.79 | 0.68 | Seed | 4.11 | 5 | 0.030 | 11.26 | 1.57 | 0.11 | 2.79 | 0.37 | 5.50 |
| | | | | | | | | | | | | Seed | 4.81 | 10 | 0.040 | 11.38 | 1.36 | 0.14 | 3.27 | 0.48 | 5.93 |
| 4546+00 | 4545+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0093 | 0.13 | 0.99 | 0.79 | 0.78 | Seed | 3.99 | 5 | 0.030 | 12.07 | 2.05 | 0.19 | 3.12 | 0.33 | 5.31 |

Paved Gutter

# DITCH ANALYSIS

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Seed | 4.64 | 10 | 0.040 | 12.30 | 1.77 | 0.25 | 3.63 | 0.42 | 5.69 |
| 4545+00 | 4544+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0215 | 0.14 | 1.13 | 0.79 | 0.89 | Seed | 3.91 | 5 | 0.030 | 12.66 | 2.79 | 0.37 | 3.49 | 0.27 | 5.10 |
| | | | | | | | | | | | | Seed | 4.52 | 10 | 0.040 | 12.99 | 2.43 | 0.47 | 4.03 | 0.35 | 5.41 |
| 4544+00 | 4543+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0211 | 0.16 | 1.29 | 0.79 | 1.02 | Seed | 3.83 | 5 | 0.030 | 13.23 | 2.89 | 0.39 | 3.91 | 0.29 | 5.18 |
| | | | | | | | | | | | | Seed | 4.41 | 10 | 0.040 | 13.65 | 2.50 | 0.50 | 4.49 | 0.38 | 5.51 |
| 4543+00 | 4542+00 | L | 100.00 | 4.00 | 2.00 | 2.00 | 0.0117 | 0.17 | 1.46 | 0.79 | 1.15 | Seed | 3.75 | 5 | 0.030 | 13.90 | 2.46 | 0.27 | 4.33 | 0.37 | 5.48 |
| | | | | | | | | | | | | Seed | 4.28 | 10 | 0.040 | 14.43 | 2.11 | 0.35 | 4.94 | 0.47 | 5.89 |
| 4542+00 | 4541+25 | L | 75.00 | 4.00 | 2.00 | 2.00 | 0.0119 | 0.13 | 1.59 | 0.79 | 1.26 | Seed | 3.69 | 5 | 0.030 | 14.40 | 2.53 | 0.28 | 4.64 | 0.38 | 5.54 |
| | | | | | | | | | | | | Seed | 4.20 | 10 | 0.040 | 15.00 | 2.17 | 0.36 | 5.28 | 0.49 | 5.96 |

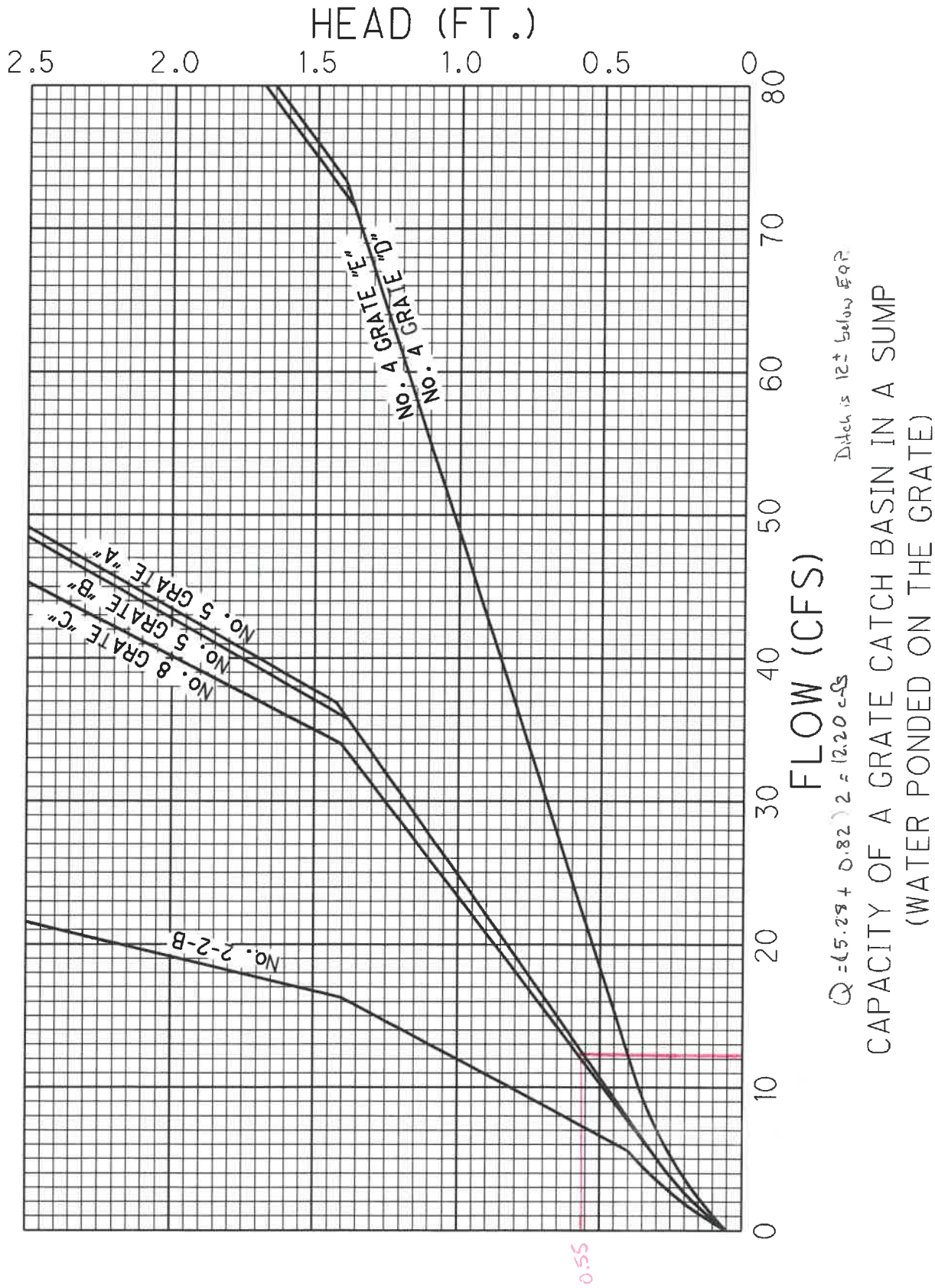
Sta. 45+41+25 Lane U Left

# CAPACITY OF A GRATE CATCH BASIN IN A SUMP

1102-1

**REFERENCE SECTION**
1102.3.5

CB-5 (Existing)




FLOW (CFS)

Ditch is 12± below EOP

Q = (5.29 + 0.82) 2 = 12.20 cfs

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

# DITCH ANALYSIS

**PID :** 101402 **Date :** 10/05/2017 **Project :** SUM-76/77 Central Int **Location :** Lane U

**Description :**4539+50 to 4541+25 Right **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4539+50 | 4540+00 | R | 50.00 | 4.00 | 4.00 | 4.00 | 0.0050 | 0.39 | 0.39 | 0.51 | 0.20 | Seed | 3.77 | 5 | 0.030 | 13.77 | 0.96 | 0.05 | 0.75 | 0.17 | 5.33 |
| | | | | | | | | | | | | Seed | 4.37 | 10 | 0.040 | 13.89 | 0.83 | 0.07 | 0.87 | 0.21 | 5.72 |
| 4540+00 | 4541+00 | R | 100.00 | 4.00 | 4.00 | 4.00 | 0.0260 | 0.68 | 1.07 | 0.51 | 0.55 | Seed | 3.68 | 5 | 0.030 | 14.48 | 2.33 | 0.30 | 2.01 | 0.18 | 5.46 |
| | | | | | | | | | | | | Seed | 4.24 | 10 | 0.040 | 14.71 | 2.01 | 0.38 | 2.31 | 0.23 | 5.87 |
| 4541+00 | 4541+25 | R | 25.00 | 4.00 | 4.00 | 4.00 | 0.0084 | 0.24 | 1.31 | 0.51 | 0.67 | Seed | 3.65 | 5 | 0.030 | 14.72 | 1.70 | 0.15 | 2.44 | 0.28 | 6.25 |
| | | | | | | | | | | | | Seed | 4.20 | 10 | 0.040 | 15.00 | 1.45 | 0.19 | 2.81 | 0.36 | 6.85 |

Flows to ex. C.B.

# DITCH ANALYSIS

**PID :** 101402 **Date :** 10/05/2017 **Project :** SUM-76/77 Central Int **Location :** Lane U

**Description :**4536+25 to 4539+50 Right **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4539+50 | 4539+00 | R | 50.00 | 4.00 | 2.00 | 2.00 | 0.0050 | 0.10 | 0.10 | 0.53 | 0.05 | Seed | 3.96 | 5 | 0.030 | 12.32 | 0.63 | 0.03 | 0.21 | 0.08 | 4.32 |
| | | | | | | | | | | | | Seed | 4.60 | 10 | 0.040 | 12.51 | 0.57 | 0.03 | 0.24 | 0.10 | 4.41 |
| 4539+00 | 4538+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0263 | 0.26 | 0.36 | 0.53 | 0.19 | Seed | 3.83 | 5 | 0.030 | 13.30 | 1.70 | 0.17 | 0.73 | 0.10 | 4.41 |
| | | | | | | | | | | | | Seed | 4.41 | 10 | 0.040 | 13.61 | 1.50 | 0.22 | 0.84 | 0.13 | 4.53 |
| 4538+00 | 4537+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0432 | 0.20 | 0.56 | 0.53 | 0.30 | Seed | 3.74 | 5 | 0.030 | 14.01 | 2.31 | 0.31 | 1.11 | 0.11 | 4.45 |
| | | | | | | | | | | | | Seed | 4.29 | 10 | 0.040 | 14.43 | 2.02 | 0.39 | 1.27 | 0.15 | 4.59 |
| 4537+00 | 4536+25 | R | 75.00 | 4.00 | 2.00 | 2.00 | 0.0484 | 0.06 | 0.62 | 0.53 | 0.33 | Seed | 3.68 | 5 | 0.030 | 14.52 | 2.47 | 0.35 | 1.21 | 0.12 | 4.46 |
| | | | | | | | | | | | | Seed | 4.20 | 10 | 0.040 | 15.00 | 2.18 | 0.45 | 1.38 | 0.15 | 4.59 |

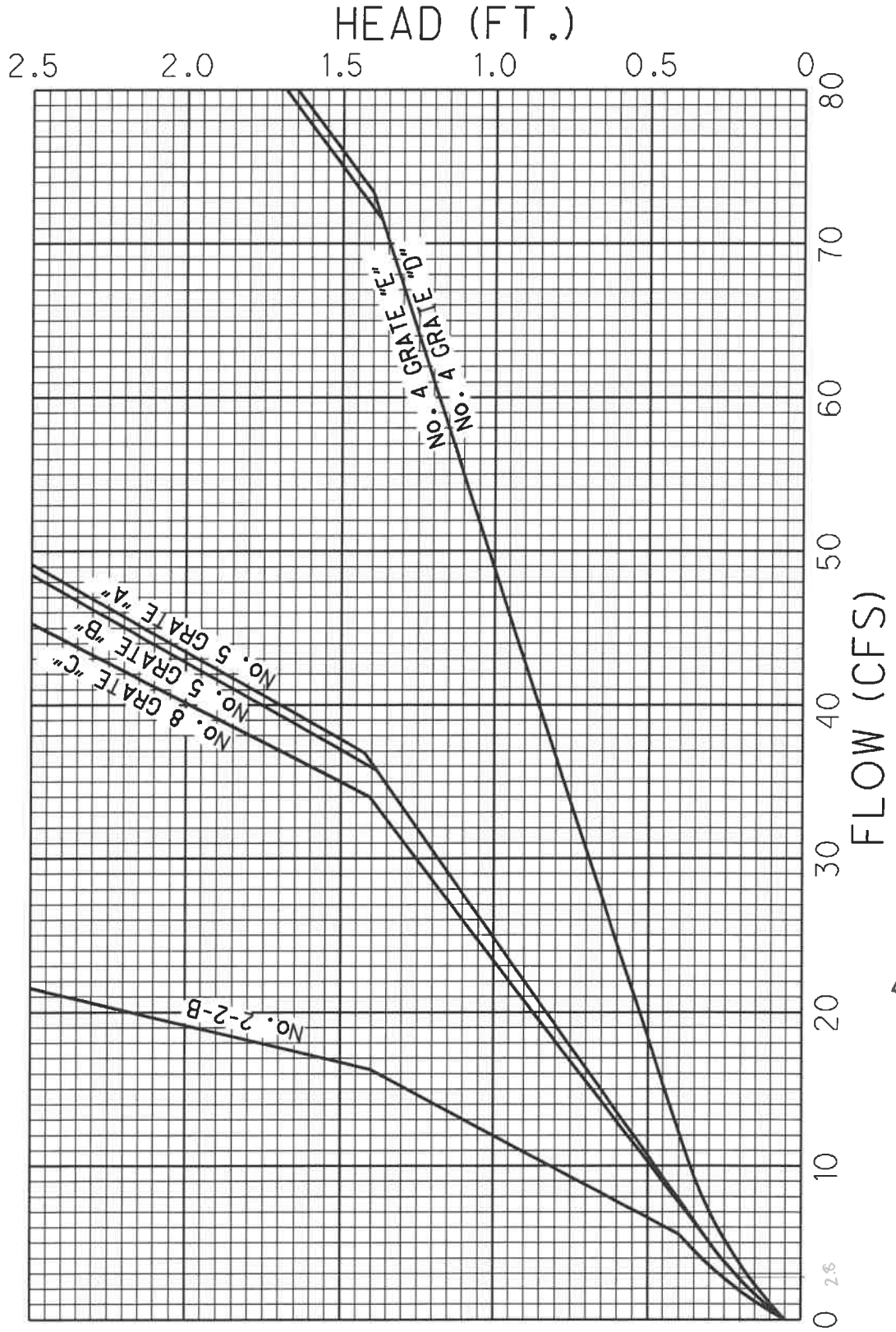
Lane U Sta. 4536+25 RT

# CAPACITY OF A GRATE CATCH BASIN IN A SUMP

1102-1

**REFERENCE SECTION**
1102.3.5

CB - 8




Q = 1.38 x 2 = 2.76 cfs

CAPACITY OF A GRATE CATCH BASIN IN A SUMP
(WATER PONDED ON THE GRATE)

# DITCH ANALYSIS

**PID :** 101402 **Date :** 10/05/2017 **Project :** SUM-76/77 Central Int **Location :** Lane U

**Description :**4542+00 to 4544+00 Right **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4542+00 | 4543+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0092 | 0.18 | 0.18 | 0.52 | 0.09 | Seed | 3.75 | 5 | 0.030 | 13.90 | 0.92 | 0.05 | 0.35 | 0.09 | 4.37 |
| | | | | | | | | | | | | Seed | 4.33 | 10 | 0.040 | 14.14 | 0.81 | 0.07 | 0.41 | 0.12 | 4.47 |
| 4543+00 | 4544+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0632 | 0.19 | 0.37 | 0.52 | 0.19 | Seed | 3.66 | 5 | 0.030 | 14.65 | 2.18 | 0.31 | 0.70 | 0.08 | 4.31 |
| | | | | | | | | | | | | Seed | 4.20 | 10 | 0.040 | 15.00 | 1.94 | 0.39 | 0.81 | 0.10 | 4.40 |

Flow to ex C.B. outside const. limits

# DITCH ANALYSIS

**PID :** 101402 **Date :** 10/05/2017 **Project :** SUM-76/77 Central Int **Location :** Lane U

**Description :**4547+75 to 4544+00 Right **Designer :** KEH

**Rainfall Area :** A

**Allowable Shears**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Seed:** | 0.40 | **Jute Mat:** | 0.45 | **Temporary Mat:** | 1.00 |
| **Permanent Mat** | **Type 1:** | 2.00 | **Type 2:** | 3.00 | **Type 3:** | 5.00 |
| **RCP** | **Type B:** | 6.00 | | | | |

(*) Warning: Grade is steeper than allowable. If value is parantheses, design parameters have been exceeded. - See user manual.

| STATION BEGIN | STATION END | SIDE | LENGTH (ft.) | RADIUS WIDTH (ft.) | IN SLOPE (ft./ft.) | BACK SLOPE (ft./ft.) | GRADE (ft./ft.) | AREA (acres) | AREA SUM (acres) | RUNOFF COEFF. | CA (Sum) | PROTECT TYPE | RAIN INT. (in./hr.) | STORM FREQ. (yrs.) | MANN. COEFF. | TIME FLOW (min.) | VEL. FLOW (fps.) | SHEAR (lbs./ sq.ft.) | DESIGN FLOW (cfs.) | DEPTH FLOW (ft.) | WIDTH FLOW (ft.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4547+75 | 4547+00 | R | 75.00 | 0.00 | 2.00 | 2.00 | 0.0440 | 0.18 | 0.18 | 0.70 | 0.13 | Seed | 3.89 | 5 | 0.030 | 12.81 | 2.71 | 0.83 | 0.49 | 0.30 | 1.20 |
| | | | | | | | | | | | | Jute Mat | 3.87 | 5 | 0.040 | 12.94 | 2.20 | 0.91 | 0.49 | 0.33 | 1.33 |
| | | | | | | | | | | | | Temp. Mat | 3.87 | 5 | 0.040 | 12.94 | 2.20 | 0.91 | 0.49 | 0.33 | 1.33 |
| | | | | | | | | | | | | Temp. Mat | 4.53 | 10 | 0.040 | 12.90 | 2.27 | 0.97 | 0.57 | 0.35 | 1.42 |
| 4547+00 | 4546+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0480 | 0.18 | 0.36 | 0.70 | 0.25 | Seed | 3.78 | 5 | 0.030 | 13.67 | 2.25 | 0.30 | 0.95 | 0.10 | 4.40 |
| | | | | | | | | | | | | Seed | 4.39 | 10 | 0.040 | 13.73 | 2.00 | 0.39 | 1.11 | 0.13 | 4.52 |
| 4546+00 | 4545+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0479 | 0.23 | 0.59 | 0.70 | 0.41 | Seed | 3.70 | 5 | 0.030 | 14.28 | 2.70 | 0.40 | 1.53 | 0.13 | 4.53 |
| | | | | | | | | | | | | Seed | 4.29 | 10 | 0.040 | 14.42 | 2.37 | 0.51 | 1.77 | 0.17 | 4.69 |
| 4545+00 | 4544+00 | R | 100.00 | 4.00 | 2.00 | 2.00 | 0.0596 | 0.27 | 0.86 | 0.70 | 0.60 | Seed | 3.64 | 5 | 0.030 | 14.78 | 3.30 | 0.57 | 2.19 | 0.15 | 4.62 |
| | | | | | | | | | | | | Jute Mat | 3.63 | 5 | 0.040 | 14.89 | 2.74 | 0.68 | 2.19 | 0.18 | 4.73 |
| | | | | | | | | | | | | Temp. Mat | 3.63 | 5 | 0.040 | 14.89 | 2.74 | 0.68 | 2.19 | 0.18 | 4.73 |
| | | | | | | | | | | | | Temp. Mat | 4.20 | 10 | 0.040 | 15.00 | 2.88 | 0.74 | 2.53 | 0.20 | 4.80 |

Flows to ex C.B. outside const limits

SR8-17
SR8-18
SR8-19
SR8-20
SR8-21
SR8-7
SR8-8
SR8-9
SR8-10
SR8-11
SR8-4
SR8-5
SR8-6
SR8-1
SR8-2
SR8-3
LU-8
LU-9
LU-10
LU-11
LU-7
LU-6
LU-5
LU-4
LU-3
LU-2
LU-1
RO-6
RO-7
RO-5
RO-4
RO-3
RO-2
RO-1
RE-2
RE-1
RE-3
RE-4
RE-5
RE-6
RE-7
RE-8
RE-9
RE-10
RE-11
RE-12
RE-13
RE-14
RE-15
RE-16
RE-17
RE-18
RE-19
RE-20
RE-21
RE-22
RE-23
RE-24
RE-25
RE-26
RE-27
RE-28
RE-29
RE-30
RE-31
RE-32
RE-33
RE-34
RE-35
RE-36
RE-37
RE-38
RE-39
RE-40
RE-41
RE-42

| | | | |
|---|---|---|---|
| Area Number | LU-1 | | |
| Total Area | 0.78 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.19 | 0.59 | 0.00 | 0 |
| C= | 0.75 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.70 | 70 | 26.0 | |
| to (min)= | 2.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 4 | 0.213 | |
| V (ft/sec)= | 1.4 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 385 | 3 | | |
| td (min.)= | 2.1 | | |
| tc=to+ts+rd= | 4.2 | | |

| | | | |
|---|---|---|---|
| Area Number | LU-2 | | |
| Total Area | 0.26 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.06 | 0.20 | 0.00 | 0 |
| C= | 0.75 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.70 | 70 | 26.0 | |
| to (min)= | 2.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 4.7 | 0.213 | |
| V (ft/sec)= | 1.5 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 120 | 3 | | |
| td (min.)= | 0.7 | | |
| tc=to+ts+rd= | 2.7 | | |

| | | | |
|---|---|---|---|
| Area Number | LU-3 | | |
| Total Area | 1.59 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.83 | 0.61 | 0.15 | 0 |
| C= | 0.79 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | 80 | 4.0 | |
| to (min)= | 2.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 5 | 0.213 | |
| V (ft/sec)= | 1.6 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 760 | 3 | | |
| td (min.)= | 4.2 | | |
| tc=to+ts+rd= | 6.3 | | |

| | | | |
|---|---|---|---|
| Area Number | LU-4 | | |
| Total Area | 0.62 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.05 | 0.00 | 0.56 | 0 |
| C= | 0.53 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.50 | 110 | 4.0 | |
| to (min)= | 7.1 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| | 6 | 0.213 | |
| V (ft/sec)= | 1.7 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 350 | 3 | | |
| td (min.)= | 1.9 | | |
| tc=to+ts+rd= | 9.1 | | |

| | | | |
|---|---|---|---|
| Area Number | LU-5 | | |
| Total Area | 1.31 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.02 | 0 | 1.29 | 0 |
| C= | 0.51 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.50 | 110 | 4.0 | |
| to (min)= | 7.1 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 10 | 0.213 | |
| V (ft/sec)= | 2.2 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 225 | 3 | | |
| td (min.)= | 1.3 | | |
| tc=to+ts+rd= | 8.4 | | |

| | | | |
|---|---|---|---|
| Area Number | LU-6 | | |
| Total Area | 0.37 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.02 | 0 | 0.35 | |
| C= | 0.52 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.50 | 10 | 4.0 | |
| to (min)= | 2.2 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| | 10 | 0.213 | |
| V (ft/sec)= | 2.2 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 205 | 3 | | |
| td (min.)= | 1.1 | | |
| tc=to+ts+rd= | 3.3 | | |

| | | | |
|---|---|---|---|
| Area Number | LU-7 | | |
| Total Area | 0.86 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.43 | 0 | 0.43 | |
| C= | 0.70 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | 60 | 4.0 | |
| to (min)= | 1.8 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 10 | 0.213 | |
| V (ft/sec)= | 2.2 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 430 | 3 | | |
| td (min.)= | 2.4 | | |
| tc=to+ts+rd= | 4.1 | | |

| | | | |
|---|---|---|---|
| Area Number | LU-8 | | |
| Total Area | 0.34 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.14 | 0.20 | | |
| C= | 0.78 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | | 4.0 | |
| to (min)= | 0.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 10 | 0.213 | |
| V (ft/sec)= | 2.2 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 0.0 | | |

| | | | |
|---|---|---|---|
| Area Number | LU-9 | | |
| Total Area | 0.73 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.51 | 0.22 | | |
| C= | 0.84 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | | 4.0 | |
| to (min)= | 0.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 10 | 0.213 | |
| V (ft/sec)= | 2.2 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 0.0 | | |

| | | | |
|---|---|---|---|
| Area Number | WB-1 | | |
| Total Area | 1.78 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.74 | 0.86 | 0.17 | 0 |
| C= | 0.76 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | 62 | 4.0 | |
| to (min)= | 1.8 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 4 | 0.213 | |
| V (ft/sec)= | 1.4 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 970 | 3 | | |
| td (min.)= | 5.4 | | |
| tc=to+ts+rd= | 7.2 | | |

| | | | |
|---|---|---|---|
| Area Number | WB-2 | | |
| Total Area | 0.44 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.27 | 0.17 | 0.00 | 0 |
| C= | 0.82 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | 20 | 4.0 | |
| to (min)= | 1.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 4.7 | 0.213 | |
| V (ft/sec)= | 1.5 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 355 | 3 | | |
| td (min.)= | 2.0 | | |
| tc=to+ts+rd= | 3.0 | | |

| | | | |
|---|---|---|---|
| Area Number | WB-3 | | |
| Total Area | 0.25 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.08 | 0.17 | 0.00 | 0 |
| C= | 0.76 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | 12 | 4.0 | |
| to (min)= | 0.8 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 5 | 0.213 | |
| V (ft/sec)= | 1.6 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 215 | 3 | | |
| td (min.)= | 1.2 | | |
| tc=to+ts+rd= | 2.0 | | |

| | | | |
|---|---|---|---|
| Area Number | WB-4 | | |
| Total Area | 0.49 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.24 | 0.25 | 0.00 | 0 |
| C= | 0.80 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | 50 | 4.0 | |
| to (min)= | 1.6 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 6 | 0.213 | |
| V (ft/sec)= | 1.7 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 150 | 3 | | |
| td (min.)= | 0.8 | | |
| tc=to+ts+rd= | 2.4 | | |

| | | | |
|---|---|---|---|
| Area Number | WB-5 | | |
| Total Area | 0.24 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.12 | 0 | 0.12 | 0 |
| C= | 0.73 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | 50 | 4.0 | |
| to (min)= | 1.6 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 10 | 0.213 | |
| V (ft/sec)= | 2.2 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 250 | 3 | | |
| td (min.)= | 1.4 | | |
| tc=to+ts+rd= | 3.0 | | |

| | | | |
|---|---|---|---|
| Area Number | WB-6 | | |
| Total Area | 0.41 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.09 | 0.32 | 0.00 | |
| C= | 0.74 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | 12 | 4.0 | |
| to (min)= | 0.8 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| | 10 | 0.213 | |
| V (ft/sec)= | 2.2 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 225 | 3 | | |
| td (min.)= | 1.3 | | |
| tc=to+ts+rd= | 2.0 | | |

| | | | |
|---|---|---|---|
| Area Number | WB-7 | | |
| Total Area | 0.44 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.44 | 0 | 0.00 | |
| C= | 0.90 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | 60 | 4.0 | |
| to (min)= | 1.8 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 10 | 0.213 | |
| V (ft/sec)= | 2.2 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 1.8 | | |

| | | | |
|---|---|---|---|
| Area Number | WB-8 | | |
| Total Area | 0.48 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.27 | 0.21 | 0.00 | |
| C= | 0.81 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | 60 | 4.0 | |
| to (min)= | 1.8 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 10 | 0.213 | |
| V (ft/sec)= | 2.2 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 1.8 | | |

| | | | |
|---|---|---|---|
| Area Number | EB-1 | | |
| Total Area | 0.48 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.23 | 0.26 | 0.00 | 0 |
| C= | 0.79 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | 24 | 4.0 | |
| to (min)= | 1.1 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 4 | 0.213 | |
| V (ft/sec)= | 1.4 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 510 | 3 | | |
| td (min.)= | 2.8 | | |
| tc=to+ts+rd= | 3.9 | | |

| | | | |
|---|---|---|---|
| Area Number | EB-2 | | |
| Total Area | 1.44 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.27 | 1.16 | 0.00 | 0 |
| C= | 0.74 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.70 | 32 | 26.0 | |
| to (min)= | 1.4 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 4 | 0.213 | |
| V (ft/sec)= | 1.4 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 560 | 3 | | |
| td (min.)= | 3.1 | | |
| tc=to+ts+rd= | 4.5 | | |

| | | | |
|---|---|---|---|
| Area Number | EB-3 | | |
| Total Area | 0.41 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.00 | 0.28 | 0.14 | 0 |
| C= | 0.63 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.70 | 32 | 26.0 | |
| to (min)= | 1.4 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 4 | 0.213 | |
| V (ft/sec)= | 1.4 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 560 | 3 | | |
| td (min.)= | 3.1 | | |
| tc=to+ts+rd= | 4.5 | | |

| | | | |
|---|---|---|---|
| Area Number | EB-4 | | |
| Total Area | 0.43 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.09 | 0.24 | 0.10 | 0 |
| C= | 0.69 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.70 | 32 | 26.0 | |
| to (min)= | 1.4 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 4 | 0.213 | |
| V (ft/sec)= | 1.4 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 560 | 3 | | |
| td (min.)= | 3.1 | | |
| tc=to+ts+rd= | 4.5 | | |

| | | | |
|---|---|---|---|
| Area Number | RN-1 | | |
| Total Area | 0.11 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.08 | 0.02 | 0.00 | 0 |
| C= | 0.86 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.70 | 80 | 26.0 | |
| to (min)= | 2.2 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 4 | 0.213 | |
| V (ft/sec)= | 1.4 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 10 | 3 | | |
| td (min.)= | 0.1 | | |
| tc=to+ts+rd= | 2.2 | | |

| | | | |
|---|---|---|---|
| Area Number | RN-2 | | |
| Total Area | 0.72 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.29 | 0.25 | 0.17 | 0 |
| C= | 0.73 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | 24 | 2.0 | |
| to (min)= | 1.4 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 4 | 0.213 | |
| V (ft/sec)= | 1.4 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 233 | 3 | | |
| td (min.)= | 1.3 | | |
| tc=to+ts+rd= | 2.7 | | |

| | | | |
|---|---|---|---|
| Area Number | RN-3 | | |
| Total Area | 0.35 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.16 | 0.04 | 0.15 | 0 |
| C= | 0.70 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | 24 | 2.0 | |
| to (min)= | 1.4 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 4 | 0.213 | |
| V (ft/sec)= | 1.4 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 200 | 3 | | |
| td (min.)= | 1.1 | | |
| tc=to+ts+rd= | 2.5 | | |

| | | | |
|---|---|---|---|
| Area Number | RN-4 | | |
| Total Area | 1.25 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.63 | 0.00 | 0.61 | 0 |
| C= | 0.70 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | 24 | 2.0 | |
| to (min)= | 1.4 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 4 | 0.213 | |
| V (ft/sec)= | 1.4 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 580 | 3 | | |
| td (min.)= | 3.2 | | |
| tc=to+ts+rd= | 4.6 | | |

| | | | |
|---|---|---|---|
| Area Number | SR8-1 | | |
| Total Area | 0.98 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.43 | 0.55 | 0.00 | |
| C= | 0.79 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | 60 | 4.0 | |
| to (min)= | | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 10 | 0.213 | |
| V (ft/sec)= | FALSE | | |
| ts (min)= | #DIV/0! | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | #DIV/0! | | |

| | | | |
|---|---|---|---|
| Area Number | SR8-2 | | |
| Total Area | 0.95 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.36 | 0.59 | 0.00 | |
| C= | 0.78 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | 60 | 4.0 | |
| to (min)= | | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 10 | 0.213 | |
| V (ft/sec)= | | | |
| ts (min)= | #DIV/0! | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | #DIV/0! | | |

| | | | |
|---|---|---|---|
| Area Number | SR8-3 | | |
| Total Area | 0.60 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.27 | 0.33 | 0.00 | |
| C= | 0.79 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | 60 | 4.0 | |
| to (min)= | | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 10 | 0.213 | |
| V (ft/sec)= | | | |
| ts (min)= | #DIV/0! | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | #DIV/0! | | |

| | | | |
|---|---|---|---|
| Area Number | South-1 | | |
| Total Area | 0.61 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.10 | 0.51 | 0.00 | |
| C= | 0.73 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | 60 | 4.0 | |
| to (min)= | | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 10 | 0.213 | |
| V (ft/sec)= | | | |
| ts (min)= | #DIV/0! | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | #DIV/0! | | |

| | | | |
|---|---|---|---|
| Area Number | LM-1 | | |
| Total Area | 1.00 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.61 | 0.39 | 0.00 | 0 |
| C= | 0.82 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.70 | 0 | 26.0 | |
| to (min)= | 0.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 4 | 0.213 | |
| V (ft/sec)= | 1.4 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 0.0 | | |

| | | | |
|---|---|---|---|
| Area Number | LM-2 | | |
| Total Area | 0.14 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.10 | 0.04 | 0.00 | 0 |
| C= | 0.84 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.70 | 0 | 26.0 | |
| to (min)= | 0.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 4.7 | 0.213 | |
| V (ft/sec)= | 1.5 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 0.0 | | |

| | | | |
|---|---|---|---|
| Area Number | LM-3 | | |
| Total Area | 0.40 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.18 | 0.22 | 0.00 | 0 |
| C= | 0.79 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | 0 | 4.0 | |
| to (min)= | 0.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 5 | 0.213 | |
| V (ft/sec)= | 1.6 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 0.0 | | |

| | | | |
|---|---|---|---|
| Area Number | LM-4 | | |
| Total Area | 0.13 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.05 | 0.08 | 0.00 | 0 |
| C= | 0.78 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.50 | 0 | 4.0 | |
| to (min)= | 0.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| | 6 | 0.213 | |
| V (ft/sec)= | 1.7 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 0.0 | | |

| | | | |
|---|---|---|---|
| Area Number | LM-5 | Includes bridge deck area | |
| Total Area | 0.79 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.10 | 0.70 | | 0 |
| C= | 0.72 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.50 | 0 | 4.0 | |
| to (min)= | 0.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 10 | 0.213 | |
| V (ft/sec)= | 2.2 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 0.0 | | |

| | | | |
|---|---|---|---|
| Area Number | LM-6 | | |
| Total Area | 0.31 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.10 | 0.21 | | |
| C= | 0.77 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.50 | 0 | 4.0 | |
| to (min)= | 0.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| | 10 | 0.213 | |
| V (ft/sec)= | 2.2 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 0.0 | | |

| | | | |
|---|---|---|---|
| Area Number | LM-7 | | |
| Total Area | 0.07 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.01 | 0.06 | | |
| C= | 0.74 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | 0 | 4.0 | |
| to (min)= | 0.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 10 | 0.213 | |
| V (ft/sec)= | 2.2 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 0.0 | | |

| | | | |
|---|---|---|---|
| Area Number | LM-8 | | |
| Total Area | 0.42 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.06 | 0.34 | 0.02 | |
| C= | 0.72 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | | 4.0 | |
| to (min)= | 0.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 10 | 0.213 | |
| V (ft/sec)= | 2.2 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 0.0 | | |

| | | | |
|---|---|---|---|
| Area Number | LM-9 | | |
| Total Area | 0.21 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.01 | 0.05 | 0.15 | |
| C= | 0.57 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | | 4.0 | |
| to (min)= | 0.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 10 | 0.213 | |
| V (ft/sec)= | 2.2 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 0.0 | | |

| | | | |
|---|---|---|---|
| Area Number | LM-10 | | |
| Total Area | 1.59 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.51 | 0.21 | 0.87 | |
| C= | 0.65 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | | 4.0 | |
| to (min)= | 0.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 10 | 0.213 | |
| V (ft/sec)= | 2.2 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 0.0 | | |

| | | | |
|---|---|---|---|
| Area Number | RT-1 | | |
| Total Area | 0.33 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.19 | 0.13 | 0.00 | 0 |
| C= | 0.82 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.70 | 0 | 26.0 | |
| to (min)= | 0.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 4 | 0.213 | |
| V (ft/sec)= | 1.4 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 0.0 | | |

| | | | |
|---|---|---|---|
| Area Number | RT-2 | | |
| Total Area | 0.88 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.37 | 0.52 | 0.00 | 0 |
| C= | 0.78 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.70 | 0 | 26.0 | |
| to (min)= | 0.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 4.7 | 0.213 | |
| V (ft/sec)= | 1.5 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 0.0 | | |

| | | | |
|---|---|---|---|
| Area Number | RT-3 | | |
| Total Area | 1.03 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.44 | 0.59 | 0.00 | 0 |
| C= | 0.79 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | 0 | 4.0 | |
| to (min)= | 0.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 5 | 0.213 | |
| V (ft/sec)= | 1.6 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 0.0 | | |

| | | | |
|---|---|---|---|
| Area Number | RT-4 | | |
| Total Area | 0.53 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.53 | 0.00 | 0.00 | 0 |
| C= | 0.90 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.50 | 0 | 4.0 | |
| to (min)= | 0.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| | 6 | 0.213 | |
| V (ft/sec)= | 1.7 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 0.0 | | |

| | | | |
|---|---|---|---|
| Area Number | RT-5 | Includes bridge deck area | |
| Total Area | 0.44 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.44 | 0.00 | | 0 |
| C= | 0.90 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.50 | 0 | 4.0 | |
| to (min)= | 0.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 10 | 0.213 | |
| V (ft/sec)= | 2.2 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 0.0 | | |

| | | | |
|---|---|---|---|
| Area Number | RT-6 | | |
| Total Area | 0.63 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.63 | 0.00 | | |
| C= | 0.90 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.50 | 0 | 4.0 | |
| to (min)= | 0.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| | 10 | 0.213 | |
| V (ft/sec)= | 2.2 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 0.0 | | |

| | | | |
|---|---|---|---|
| Area Number | RO-1 | | |
| Total Area | 0.33 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.11 | 0.00 | 0.22 | 0 |
| C= | 0.63 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.50 | 0 | 4.0 | |
| to (min)= | 0.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 7 | 0.213 | |
| V (ft/sec)= | 1.8 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 0.0 | | |

| | | | |
|---|---|---|---|
| Area Number | RO-2 | | |
| Total Area | 1.84 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.09 | 0.00 | 1.75 | 0 |
| C= | 0.52 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.50 | 300 | 4.0 | |
| to (min)= | 11.8 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 275 | 7 | 0.213 | |
| V (ft/sec)= | 1.8 | | |
| ts (min)= | 2.5 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 14.3 | | |

| | | | |
|---|---|---|---|
| Area Number | RO-3 | | |
| Total Area | 0.15 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.02 | 0.13 | 0.00 | 0 |
| C= | 0.73 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.90 | 0 | 4.0 | |
| to (min)= | 0.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 5 | 0.213 | |
| V (ft/sec)= | 1.6 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 0.0 | | |

| | | | |
|---|---|---|---|
| Area Number | RO-4 | | |
| Total Area | 0.38 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.10 | 0.28 | 0.00 | 0 |
| C= | 0.75 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.50 | 0 | 4.0 | |
| to (min)= | 0.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| | 6 | 0.213 | |
| V (ft/sec)= | 1.7 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 0.0 | | |

| | | | |
|---|---|---|---|
| Area Number | RO-5 | Includes bridge deck area | |
| Total Area | 0.36 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.12 | 0.24 | | 0 |
| C= | 0.77 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.50 | 0 | 4.0 | |
| to (min)= | 0.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| 0 | 10 | 0.213 | |
| V (ft/sec)= | 2.2 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 0.0 | | |

| | | | |
|---|---|---|---|
| Area Number | RO-6 | | |
| Total Area | 0.31 | | |
| Runoff Coeficinet | | | |
| Area Use | | | |
| Impervious C=0.9 | Slope Steeper than 4:1 C=0.7 | Slope 4:1 & Flatter C=0.5 | Lawn/Woods C=0.3 |
| 0.06 | 0.25 | | |
| C= | 0.74 | | |
| Time of Concentraton (tc) | | | |
| Overland to | | | |
| C (Runoff Coefficent) | L (Length-ft) | s (Slope-%) | |
| 0.50 | 0 | 4.0 | |
| to (min)= | 0.0 | | |
| Shallow Concentrated | | | |
| L (Length-ft) | s (Slope-%) | Type of Surface (1101-1) | |
| | 10 | 0.213 | |
| V (ft/sec)= | 2.2 | | |
| ts (min)= | 0.0 | | |
| Ditch/Pipe Flow | | | |
| L (Length-ft) | Velocity (ft/sec) | | |
| 0 | 3 | | |
| td (min.)= | 0.0 | | |
| tc=to+ts+rd= | 0.0 | | |