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# PRELIMINARY DRAINAGE REPORT
# FOR
# WATERBURY PHASE 2
# (PUD DEVELOPMENT PLAN)

**JULY 2017**

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Job No. 1715.00

## DRAINAGE REPORT STATEMENT

### ENGINEER'S STATEMENT:

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the Drainage Criteria Manual for the City of Colorado Springs and El Paso County. I accept responsibility for any liability caused by any negligent acts, errors, or omissions on my part in preparing this report.

_____ _____

L Ducett, Colorado P.E. #32339 Date

### DEVELOPER'S STATEMENT:

I, the developer, have read and will comply with all of the requirements specified in this drainage report and plan.

Business Name: 4-Way Ranch Joint Venture

_____

Title: _____

Address: P.O. Box 50223

Colorado Springs, CO 80949

EL PASO COUNTY:

Filed in accordance with Section 51.1 of the El Paso Land Development Code, as amended.

_____ _____

For El Paso County Engineer/Director Date

Conditions:

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**PURPOSE**

This document is Preliminary Drainage Report for Waterbury Phase 2 Preliminary Plan. The purpose of this report is to schematically address on-site and off-site drainage patterns as discussed and approved

within the Master Development Drainage Plan (MDDP) for 4-Way Ranch – Phase 1 and provide general methods to handle these flows based on the PUD Development Plan and Phase 2 Preliminary Plan via on-site detention and possible channel improvements in order to limit any flows released off-site to historic levels or less. This report will remain in general compliance with the recently approved MDDP and be followed up with a Final Drainage Report submitted in conjunction with any Final Plat submittals. This report is in general conformance with the previously submitted "Conceptual Drainage Report for Waterbury (PUD Development Plan)" (CDR) by Classic Consulting Engineers and Surveyors, LLC dated May, August and November 2012. This report will lean heavily on this previous report. This report will lay the groundwork for the phasing and interim routing of storm water for the development of this phase. Additional details and calculations will be provided in the Final Drainage Report.

## GENERAL DESCRIPTION

The Waterbury (PUD Development Plan) site is a 322-acre site located in the county of El Paso within Sections 28, 29 and 33, Township 12 South, Range 64 West of the Sixth Principal Meridian, El Paso County, Colorado. This report covers the area known as the Waterbury Phase 2 Preliminary Plan which is a part of the overall PUD Development Plan. This Phase is 78.384 acres and is north of the Phase 1 Preliminary Plan area. The site is bounded on the north by unplatted property (future phases of the overall 4-Way Ranch property), to the east by unplatted property (future phases of the overall 4-Way Ranch property), to the south by the recently platted lots (4-Way Ranch Filing No. 3), and to the west by Eastonville Road. The site is 78.384 acres and is proposed for 234 single family units with 19.1 acres of tracts of which 16.14 acres is open space and drainage tracts. The residential lots will range in size from a 4600 S.F. to 10,000 S.F. The Preliminary Plan that was previously submitted remains generally consistent with the currently approved PUD Development Plan, Zoning and Conceptual Plan for 4-Way Ranch Phase 1. However, the zoning approval of 3.5 DU/acre allows for 1,610 units and the PUD Development Plan proposes only 1,000 units. This reduction in density will likely slightly reduce the size of the required detention facilities and on-site developed flows as presented in the MDDP. A first phase Final Plat will be submitted at a later date based on the area phasing plan. At that time, a final drainage report for this platted area will better define the exact storm systems, any channel improvements and detention facilities.

The average soil condition reflects Hydrologic Groups "A" (Columbine gravelly sandy loam 19) and "B" (Stapleton sandy loam 83), as determined by the "Soil Survey of El Paso County Area," prepared by the Soil Conservation Service. (See Appendix) For the purposes of the hydrologic calculations within this report, the soil type B was utilized.

## EXISTING DRAINAGE CONDITIONS

Existing drainage from the Waterbury Phase 2 Preliminary Plan site is generally from northwest to southeast by way of existing natural drainage swales. The majority of the site is covered with native grasses and no trees. There are three major drainageways on the site:

Two offsite basins enter into the site from culverts under Eastonville Road.

These existing facilities (30" CMP and 36" CMP) currently take undetained historic flows mainly from the Falcon High School property. Any further future development within these basins per the Conceptual Drainage Plan(CDR) ( Basins OS-5 and OS-6, $Q_5$ = 5 cfs and $Q_{100}$ = 11 cfs and $Q_5$ = 6 cfs and $Q_{100}$ = 19 cfs), respectively), as presented in the MDDP ( Basins WFB3A and WFB3B, Design Points 5 and 4, Q5=5.8 Q100=18.8, Q5=2.5 Q100=6.5 respectively), will be required to detain to the historic levels as these flows are used in any downstream calculations. Basin OS-1 corresponds with the CDR basin OS-6 and the MDDP Basin WFB3A (Design Point 5) and has approximately 13.3 acres producing flows of 8.5 cfs and 19.6 cfs in the historic 5 and 100 year conditions at **Design Point OS-1**.

Basin OS-2 (OS-5 from the CDR and WFB3B Deisign Point 4 from the MDDP) has 3.2 acres and produces flow of 1.7 and 3.8 cfs in the 5 and 100 year conditions at **Design Point OS-2**. These flows are slightly lower than the CDR and will be verified with the Final Drainage Report. Per the MDDP, flows are greatly reduced at this point as flows from the high school have been redirected across Londonderry Road and to the south.

Flows from OS-3's 3.9 acres produce a Q5=3.6 cfs and a Q100=8.6 cfs at **Design Point OS-3**.
Flows from OS-4's 0.5 acres produce a Q5=0.5 cfs and a Q100=1.1 cfs at **Design Point OS-4**.
Flows from OS-5's 1.8 acres produce a Q5=1.6 cfs and a Q100=3.7 cfs at **Design Point OS-5**.

Flows from OS-1 enter the site flowing from the west to the east overland through the existing 24" CMP under Eastonville Road and flow overland across Basin 1. Flows from OS-1 combine with runoff from Basin 1's 52.9 acres and Basin OS-5's 1.8 acres to produce total combined flows of Q5=36.2 cfs and Q100=80.9 cfs at **Design Point 3**. This basin was called Basin B1 in the MDDP and had flows of 23.8 cfs in the Q5 and 99 cfs in the Q100. This basin was 74.88 acres in the MDDP and outflowed to Design Point B1-J2.

The intent for this corridor is to remain in its natural state as much as possible but will likely have its

location altered slightly based on the proposed lot layout and may contain some channel improvements including some smaller detention areas. Upon final platting of the lots adjacent to this corridor, the final drainage report will better define the exact flows and present the final channel improvements/detention facilities within this corridor.

Flows from OS-2's 3.2 acres flow from the west to the east under Eastonville Road in an existing 36" CMP culvert and are conveyed in the roadside ditch to design point OS-2. This drainage pattern will be maintained in the roadside ditch until Eastonville Road is improved to an urban cross section. At that time, the party responsible for improving Easontville Road will likely convey this flow in a storm system. The capacity of the ditch will be verified at the time of the FDR for the subdivision plat of Waterbury that is adjacent to this area.

Basin 2's 7.1 acres produces existing flows of Q5=4.6 cfs and Q100=10.5 cfs. These flows are conveyed overland to **Design Point 2** where they flow into the future filing of Waterbury.

Basin 3's 0.9 acres produces existing flows of Q5=0.8 cfs and Q100=1.9 cfs. These flows are conveyed overland to **Design Point 1** where they flow offsite into the future filing of Waterbury.

Basin 4's 15.7 acres produces existing flows of Q5=7.6 cfs and Q100=17.1 cfs. These flows are combined with flows from Basin OS-4's 0.5 acres where they produce combined flows of Q5=8.2 cfs and Q100=18.4 cfs which is conveyed overland to **Design Point 4** where they flow offsite into the future filing of Waterbury.

Basin 5's 3.0 acres produces existing flows of Q5=2.0 cfs and Q100=4.5 cfs. These flows are conveyed overland to **Design Point 5** where they flow onto the Waterbury Phase 1 and will be accounted for in the Waterbury Filing 3 Final Drainage Report.

## DEVELOPED DRAINAGE CONDITIONS

The following basin descriptions account for the following:

No at-grade inlets have been proposed at this time. All sump conditions have assumed an even split of flows for the preliminary sizing of the Type R inlets at each low point. The individual Final Drainage Report(s) will better define developed flows within each basin to determine curb capacity/at-grade inlet requirements and specific sump inlet sizing based on flows for each side of the street. All preliminary pipe sizing is based on an assumed pipe slope of 1%. Unless there was a major change from the CDR we have used that information where appropriate.

We have left the design points from the CDR in the exhibit for proposed drainage conditions in the appendix. The CDR design points are shown in orange hexagons, the proposed design points for our report

are shown in blue triangles.

Three full spectrum detention ponds were proposed in the CDR. They are Pond 2A, Pond 2B and Pond 2C. Pond 2A will be constructed with Phase 1 Filing 3, Pond 2B will be constructed with Phase 2 Filing 1 and Pond 2C will be constructed with the future phase and filing of Waterbury to the east of Phase 2. The area that drains to Pond 2C will be contained in a temporary sediment basin that is currently being designed as part of Phase 1 Filing 1-3. A temporary swale will take flows from the south east corner of this site's storm sewer and convey it to the temporary sediment basin. Final sizing of these facilities is deferred to the final drainage reports. Preliminary sizing of these facilities was completed with the CDR and have been reviewed but will not be revised for this report.

Off-site flows from the offsite temporary pond at the southwest corner of Londonderry Drive and Eastonville Road will continue to outfall via the (3) 42" RCP's under Eastonville Road and into the natural channel on-site along the westerly property line. These flows ($Q_5$ = 28 cfs and $Q_{100}$ = 135 cfs) will then combine with the on-site flows of Basin D's 3.3 acres (which includes rear yards and the 80' ROW of Eastonville Road) ($Q_5$ = 2.5 cfs and $Q_{100}$ = 5.0 cfs) and Basin OS-2's 3.2 acres ($Q_5$ = 1.7 cfs and $Q_{100}$ = 3.8 cfs). Basin OS-2 flows travel from the west to the east under Eastonville Road in the existing 36" CMP culvert. An existing ditch or a future pipe will carry flows from Basin OS-2 at the east end of the existing culverts and from Basin D to the south and into the outfall from the triple 42" RCP culverts. Combined flows from Basin D and OS-2 are anticipated to be Q5=3.3 cfs, Q100=6.8 cfs at **Design Point OS-2.** These flows will combine with flows from the triple 42" culverts and from Design Point D's flow from Basin CC's 1.54 acres of rear yards and with a Q5= 1.6 cfs and a Q100= 3.3 cfs and will flow to the south and then eventually into Pond 1 in Filing 1 of Phase 1. Flows from Phase 1 combine with these flows and are conveyed to CDR design point 1 where they are detained in Pond 1. See the CDR and Phase 1 Filing 1 FDR for the sizing of Pond 1. The final drainage report for these specific final platted lots will examine this channel flow further to determine any required improvements and LOMR/CLOMR requirements.

**See the CDR's Design Point 1 discussion for flows from this point and flows into Pond 1.**

The northwest portion of this development will be routed via public storm systems and the upper portion of the internal natural channel towards the proposed Pond 2A. The following basins are tributary to this facility:

Basin A's 4.86 acres of overland flow flows via curb and gutter to **Design Point A**. Flows at this point are Q5=7.5 cfs and Q100=14.5 cfs. It is proposed that these flows will flow via curb and gutter into Filing 3 of

Phase 1. They are picked up at the CDR Design Point 6 in dual 4' sump storm inlets. These inlets will be final designed with the Filing 3 Phase 1 FDR. These flows travel via proposed 30" RCP storm sewer to Pond 2A.

Basin C's 1.2 acres produce overland flows of Q5=1.8 cfs and Q100=3.6 cfs. These flows will travel from the back yards of the lots along Eastonville Road in the ditch and then into an area inlet at the rear of the lots where they will combine with flows from the existing 30" CMP culvert under Eastonville Road which conveys Basin OS-1's flow from **Design Point OS-1** on the west side of Eastonville Road's 13.3 acres (Q5=8.6 cfs Q100=19.7 cfs) to produce combined flows of Q5=10.4 cfs and Q100=23.1 cfs at **Design Point C**. These flows will be collected in a proposed 30" RCP storm sewer (**Pipe Run 1**) and conveyed between the lots in a proposed public drainage easement or tract to the east and into the proposed drainage tract F. At this point they will flow overland and combine with flows from Basin N's 9.63 acres (Q5=10.1 cfs Q100=21.0 cfs) to Proposed Pond 2A.

Basin O's 3.51 acres of overland flow flows via curb and gutter to **Design Point O**. Flows at this point are Q5=5.9 cfs and Q100=11.5 cfs. It is proposed that these flows will flow via curb and gutter into Filing 3 of Phase 1. They are picked up at the CDR **Design Point 7** in dual 16' sump storm inlets. These inlets will be final designed with the Filing 3 Phase 1 FDR. These flows travel via proposed 42" RCP storm sewer to Pond 2A.

Basin P's 1.73 acres of overland flow flows via curb and gutter to **Design Point P**. Flows at this point are Q5=3.5 cfs and Q100=7.1 cfs. It is proposed that these flows will flow via curb and gutter into Filing 3 of Phase 1. They are picked up at the CDR **Design Point 7** in dual 16' sump storm inlets. These inlets will be final designed with the Filing 3 Phase 1 FDR. These flows travel via proposed 42" RCP storm sewer to Pond 2A.

Basin Q's 5.84 acres of overland flow flows via curb and gutter to **Design Point Q**. Flows at this point are Q5=8.6 cfs and Q100=16.5 cfs. It is proposed that these flows will flow via curb and gutter into Filing 3 of Phase 1. They are picked up at the CDR **Design Point 7** in dual 16' sump storm inlets. These inlets will be final designed with the Filing 3 Phase 1 FDR. These flows travel via proposed 42" RCP storm sewer to Pond 2A.

Basin R's 1.86 acres of overland flow flows via curb and gutter to **Design Point R**. Flows at this point are Q5=2.7 cfs and Q100=5.1 cfs. It is proposed that these flows will flow via curb and gutter into Filing 3 of

Phase 1. They are picked up at the CDR **Design Point 7** in dual 16' sump storm inlets. These inlets will be final designed with the Filing 3 Phase 1 FDR. These flows travel via proposed 42" RCP storm sewer to Pond 2A.

Combined flows at **Design Point 7** from the CDR are Q5=29 cfs and Q100=62 cfs. Two 16' sump inlets are proposed at this point with a 42" RCP storm sewer to the proposed Pond 2A.

Basin OS-3's 3.9 acres of overland flow flows overland to **Design Point OS-3**. Flows at this point are Q5=7.4 cfs and Q100=14.6 cfs. It is proposed that these flows will flow via overland flow into Basin E where they combine with Basin E's runoff. Basin E's runoff from its 0.63 acres will produce flows of Q5=1.5 cfs and Q100 of 3.0 cfs. These flows flow via curb and gutter and combine with flows from Design Point OS-3 to produce combined flows of Q5=8.5 cfs and Q100=16.9 cfs at **Design Point E**. In the CDR at **Design Point 9**, dual 4' sump inlets are proposed at this location in the future filing. In the interim, prior to the construction of the future filing, there will be a standpipe and a proposed temporary sediment pond to collect flows and direct them to the proposed 30" RCP storm sewer (**Pipe Run 2**).

Basin F's 1.37 acres of overland flow flows overland and then in curb and gutter to **Design Point F which is also known as Design Point 10 in the CDR**. Flows at this point are Q5=2.6 cfs and Q100=5.1 cfs. A 4' sump inlet is proposed at this location. From this point, flows from this inlet will join flows from Design Point E in a proposed 30" RCP (Pipe Run 3) storm sewer and flow south to **Design Point G or the CDR Design Point 11.** Combined flows in this pipe from **Design Point F** and **Design Point E** are Q5=19.0 cfs and Q100=37.6 cfs.

Basin B's 6.07 acres of runoff ( Q5=9.5 cfs Q100=18.4 cfs) flows overland and then in curb and gutter to **Design Point B which is also known as Design Point 11 in the CDR**. Flows at this point combine with flows from Basin G's 2.41 acres (Q5=4.4 cfs and Q100=8.8 cfs) at **Design Point G** and are a combined flow of Q5=15.6 cfs and Q100=30.9 cfs when combined with flows from **Design Point B**. Dual 8' sump inlets are proposed at this location. From this point, flows from this inlet will join flows from **Design Point E** in a proposed 36" RCP storm sewer (**Pipe Run 4**) and flow south to **Design Point K or the CDR Design Point 12.** Combined flows in this pipe **(Pipe Run 4)** from **Design Point G** and **Design Point F** are Q5=29.4 cfs and Q100=57.0 cfs.

Basin K's 4.16 acres of runoff ( Q5=6.4 cfs Q100=12.3 cfs) flows overland and then in curb and gutter to **Design Point K which is also known as Design Point 12 in the CDR**. Flows at this point combine with

flows from Basin J's 3.9 acres (Q5= 8.9 cfs and Q100=18.1 cfs) and Basin OS-4's 0.5 acres (Q5=1.0and Q100=1.9 cfs) and Basin M's 0.83 acres (Q5=1.7 and Q100=3.4 cfs) at **Design Point K** and are a combined flow of Q5=14.4 cfs and Q100=27.8 cfs. Dual 8' sump inlets are proposed at this location. From this point, flows from this inlet will join flows from **Design Point G** in a proposed 42" RCP storm sewer (**Pipe Run 5**)and flow south to **Pond 2A or the CDR Design Point 13.** Combined flows in this pipe **(Pipe Run 5)** from **Design Point K** are Q5=42.3 cfs and Q100=81.7 cfs. Pond 2A is an in-line facility and will release detained flows through a single 30" RCP culvert crossing under Muddy Pond St. into the channel towards Detention Pond 2B. It has the following design parameters per the CDR:

**Detention Pond 2A (Full Spectrum)**
**3.24 Ac.-ft. EURV required**
**5.11 Ac.-ft. design with 4:1 max. slopes and 8' max. depth**
**Total In-flow:** $Q_5$ **= 78 cfs,** $Q_{100}$ **= 167 cfs**
**Design Release:** $Q_5$ **= 45 cfs,** $Q_{100}$ **= 70 cfs**
**Max. 100 yr. WSE = 6939.03**

Pond 2A will be constructed as part of this Phase 2 Development. Timing of Pond 2A depends on the phasing of the final platting and will be detailed in the final drainage reports for each filing.

The release from Pond 2A then travels in the downstream channel towards Pond 2B.
Pond 2B has Design Point 14 from the CDR and from Phase I tributary to it and flows from Basin S's 6.86 acres of onsite flow that flow overland and from back yards and the pond tract. Flows from Basin S are Q5=7.4 cfs and Q100=15.3 cfs these flows flow overland into Pond 2B at **Design Point S.**

The following Phase I basins are tributary to this facility: See the Filing 1, 2 and 3 Phase I FDR's and the CDR. Per the CDR: Basin B9 develops flows that travel as curb and gutter flow towards **Design Point 14** ($Q_5$ = 16 cfs and $Q_{100}$ = 33 cfs). At this location a single 16' Type R sump inlet will collect both the 5 yr. and 100 yr. developed flows completely. The collected flows will then be routed via a 30" RCP in an easterly direction directly into Pond 2B. Basin B10 develops flows that travel as curb and gutter flow towards **Design Point 15** ($Q_5$ = 7 cfs and $Q_{100}$ = 13 cfs). At this location two 14' Type R sump inlets will collect both the 5 yr. and 100 yr. developed flows completely. The collected flows will then be routed via a 24" RCP in a northerly direction and directly into Pond 2B. Basin B11 ($Q_5$ = 11 cfs and $Q_{100}$ = 24 cfs) develops flows that travel as sheet and channel flow directly into **Pond 2B – Design Point 16** ($Q_5$ = 54 cfs and $Q_{100}$ = 103 cfs). This facility is again an in-line facility and will release detained flows through a single

24" RCP culvert crossing under Sunken Meadow Road into the channel towards Detention Pond 2C. It has the following design parameters:

**Detention Pond 2B (Full Spectrum)**

**0.94 Ac.-ft. EURV required**

**3.68 Ac.-ft. design with 4:1 max. slopes and 8' max. depth**

**Total In-flow:** $Q_5$ **= 54 cfs,** $Q_{100}$ **= 103 cfs**

**Design Release:** $Q_5$ **= 33 cfs,** $Q_{100}$ **= 47 cfs**

**Max. 100 yr. WSE = 6925.48**

Pond 2B will be constructed as part of this Phase 2 Development. Timing of Pond 2B depends on the phasing of the final platting and will be detailed in the final drainage reports for each filing.

The release from Pond 2B then travels in the downstream channel towards Pond 2C. This facility will collect flows from the central portion of Phase I. See the Phase I FDR's and the CDR for further information on this Pond.

Basin OS 5's 6.67 acres of overland flow flows via curb and gutter to **Design Point OS5**. Flows from this basin alone are Q5=11.0 cfs and Q100=21.4 cfs. Flows from Basin OS-5 combine with overland flows from Basin J's 2.0 acres (Q5=4.6 cfs Q100=9.3 cfs **Design Point J**) and Basin OS-4's 0.5 acres (Q5=1.0 cfs Q100=1.9 cfs **Design Point OS-4**) and Basin I's 2.76 acres (Q5=4.5 cfs Q100=8.8 cfs **Design Point I**) and produce total combined flows of Q5=19.6 cfs and Q100=38.3 cfs at the **Design Point H**. It is proposed that these flows will flow via curb and gutter into proposed dual 14' sump inlets and then via proposed 36" RCP storm sewer in **Pipe Run 6** to the south where they combine with flows from Basin Z's 3.75 acres (Q5=5.8 cfs Q100=11.3 cfs), Basin V's 3.68 acres (Q5=5.9 cfs Q100=11.5 cfs), Basin Y's 4.31 acres (Q5=7.1 cfs Q100=13.9 cfs), Basin X's 1.18 acres (Q5=2.6 cfs Q100=5.2 cfs), Basin W's 2.08 acres (Q5=3.7 cfs Q100=7.2 cfs) and basin BB's 1.87 acres (Q5=3.4 cfs Q100=6.8 cfs) at **Design Point W**. Total combined flows of Q5=26.8 cfs and Q100=52.1 cfs will be collected in two proposed 15' sump inlets and then combined with flows from **Pipe Run 6** and put into a proposed 42" RCP storm sewer **Pipe Run 7** and flow south to proposed Pond C.

Basin U's 4.29 acres of overland flow flows via curb and gutter to **Design Point U**. Flows from this basin alone are Q5=6.6 cfs and Q100=12.7 cfs. Flows from Basin T's 1.30 acres (Q5=2.1 cfs, Q100=4.2 cfs) combine with overland flows from Basin U at **Design Point U** for total combined flows of Q5=8.6 cfs and Q100=16.6 cfs. Dual 6' sump inlets are proposed at this location to collect flows. Flows are then piped via a proposed 30" RCP storm sewer in **Pipe Run 8 to Pipe Run 7.** These combined flows are Q5=36.2 and

Q100=70.1 and are then piped via a proposed 48" RCP storm sewer **Pipe Run 9** to proposed Pond 2C.

Flows from offsite areas in Phase 1 are also tributary to Pond 2C. A temporary pond is proposed for Filing 1, 2 and 3 in Phase I. It is anticipated that Phase 2 will necessitate the final construction of Pond 2C, however it may be best to use temporary ponds to control sediment until the entire subdivision is completed to save on maintenance during the construction phase and preserve the integrity of the pond. This pond phasing will be determined with the final drainage reports that are required at the time of final plat.

**Detention Pond 2C (Full Spectrum)**
**4.50 Ac.-ft. EURV required**
**6.82 Ac.-ft. design with 6:1 max. slopes and 8' max. depth**
**Total In-flow:** $Q_5$ = 137 cfs, $Q_{100}$ = 272 cfs
**Design Release:** $Q_5$ = 43 cfs, $Q_{100}$ = 148 cfs
**Historic Release:** $Q_5$ = 64 cfs, $Q_{100}$ = 158 cfs
**Concrete Riser Box elevation = 6897.40**
**Max. 100 yr. WSE = 6899.22**

Two proposed basins that flow off of this filing and into the future Waterbury development are Basin AA (area= 1.53 acres Q5=2.6 cfs Q100=5.2 cfs) and Basin DD (area=0.79 acres Q5=1.6 cfs Q100=3.3 cfs). These flows will be picked up in future storm sewer and for the interim will be contained in temporary sediment basins for erosion and velocity control and swaled to outflow. Details on these temporary basins will be provided with the final drainage report.

## CHANNEL IMPROVEMENTS

Any required channel improvements will likely be phased based on Final Platting. Channel improvement design will also be presented with each individual Final Plat. The major channel improvements within the FEMA 100 yr. floodplain will be in general conformance with the Gieck Ranch DBPS, thus, these improvements will off-set any drainage fees owed. The channel improvements within the center portion of the site (within the 100 yr. floodplain NOT recognized by FEMA) will be designed to accommodate the adjacent lot layouts and open space amenities yet attempt to preserve as much of the natural channel and wetland area as possible. Please note that with the attached latest JD letter from the Corp. of Eng. dated May 16, 2011, the entire site has been cleared of any jurisdictional water of the U.S. Thus, the modification, enhancement or removal of any on-site wetlands would not require a 404 permit. The specific areas where the natural channels are either too shallow or incised, improvements will be provided to handle the

developed flows and control velocities. Probable improvements in such areas may include but not be limited to the following: minor grade control structures, weirs, vegetation enhancements and varying channel widths. Detailed design of these natural channel corridors will be further presented in the final drainage report(s).

## MDDP CONFORMANCE

This proposed PUD Development Plan, from a drainage standpoint, follows the general scheme of the MDDP for 4-Way Ranch Phase 1, prepared by ADP, Inc., dated January 2012. The preliminary grading design was based on the natural topography and the suggested major on-site drainage basins depicted in the MDDP, thus the Basin nomenclature used in this report follows what was established in the MDDP. However, based on the Development plan layout and road/open space network, this report suggests the following differences from the MDDP schematic design:

### Overall Basin B and the natural channel design

Based on the proposed road network and open space corridors provided along the existing natural channel through the middle portion of the project, we have incorporated two additional detention/stormwater quality ponds (Pond 2A and 2B, in-line with this channel corridor). This design allows for further amenity enhancement, centralizes developed flow to this corridor and utilizes the channel as a water quality feature downstream of the release points and helps minimize the size of the downstream detention facility. Thus, the channel through this corridor will likely contain grade control structures in addition to the suggested vegetation enhancement.

### Full Spectrum Detention

The MDDP discusses the requirement of full spectrum detention for all facilities. This project continues to propose this concept. In addition, this project has the ability on-site to provide additional water quality features in various amenity facilities/natural channels and is 100% residential use while proposing 70+ acres of open space. Thus, this development meets the required water quality requirements as described in the DCM Volume II.

## DETENTION FACILITIES

All on-site detention facilities have been designed to accommodate the required full spectrum Excess Urban Runoff Volume (EURV) as described by the Denver Urban Drainage and Flood Control District. These facilities are proposed to be owned and maintained by the local Metro District with a private maintenance agreement with the County. Preliminary design data for each facility is contained in the Appendix.

Additional design information related to exact facility sizing and outlet structure design will be provided for each facility within the final drainage report(s) on an as platted basis.

## HYDROLOGIC CALCULATIONS

Hydrologic calculations were performed using the City of Colorado Springs/El Paso County Drainage Criteria Manual, as revised in November 1991 and 1994. The overall drainage basin design was calculated in the Conceptual Drainage Report using PondPack V8i with time of concentrations estimated using SCS procedures described in the DCM based upon the hydrologic soil type and runoff curve numbers (CN) chart. (Table 5-4) Individual on-site developed basin design used for preliminary storm system routing was calculated using the Rational Method.

## FLOODPLAIN STATEMENT

Portions of this site are located within a Zone A FEMA floodplain as determined by the Flood Insurance Rate Map (F.I.R.M.) Map Numbers 08041C 0575F, with effective date of March 17, 1997. On March 19, 2004 a Letter of Map Revision (LOMR) was obtained to refine the floodplain in this unstudied area (See Appendix). In areas where channel improvements are proposed or roadway crossings affect the floodplain, a CLOMR application will be required.

## DRAINAGE & BRIDGE FEES

This site lies within the Gieck Drainage Basin, which is tributary to Chico Creek. These fees will be calculated at time of Final Platting using the impervious acreage method approved by El Paso County. The future Final Drainage Report(s) will utilize the following impervious acreage calculation to determine the required fees.

The entire subdivision has a total area of 322 acres. Phase 2 has 78.384 acres.
The percent imperviousness for this entire subdivision is calculated as follows:

322 Ac. / 1,000 lots = 0.32 Ac./lot
(Per El Paso County Percent Impervious Chart: **30**%)
322 Ac. x 30% = **96.6 Impervious Ac.**

## SUMMARY

This proposed development remains consistent with the previously approved MDDP. All detention facilities have been designed to release at or below historic rates. The proposed development will not adversely impact surrounding developments.

PREPARED BY:

**Terra Nova Engineering, Inc.**

L Ducett, P.E.
President

N:/jobs/ 1715.00/word/1715pdr.doc

## REFERENCES


1. City of Colorado Springs/County of El Paso Drainage Criteria Manual, dated October 1991.

2. Soil Survey of El Paso County Area, Colorado Soil Conservation Service, June 1981.

3. "Master Development Drainage Plan, 4-Way Ranch - Phase 1," by Advanced Design Professionals, Inc., January 2012.

4. "Master Development Drainage Plan Amendment / Preliminary Drainage Report for 4-Way Ranch Commercial Development", by JR Engineering, October 2010.

5. "Haegler Ranch Drainage Basin Planning Study," by URS Corp., October 2008.

6. "Gieck Ranch Drainage Basin Planning Study," by Drexel Barrel & Co., February 2008.

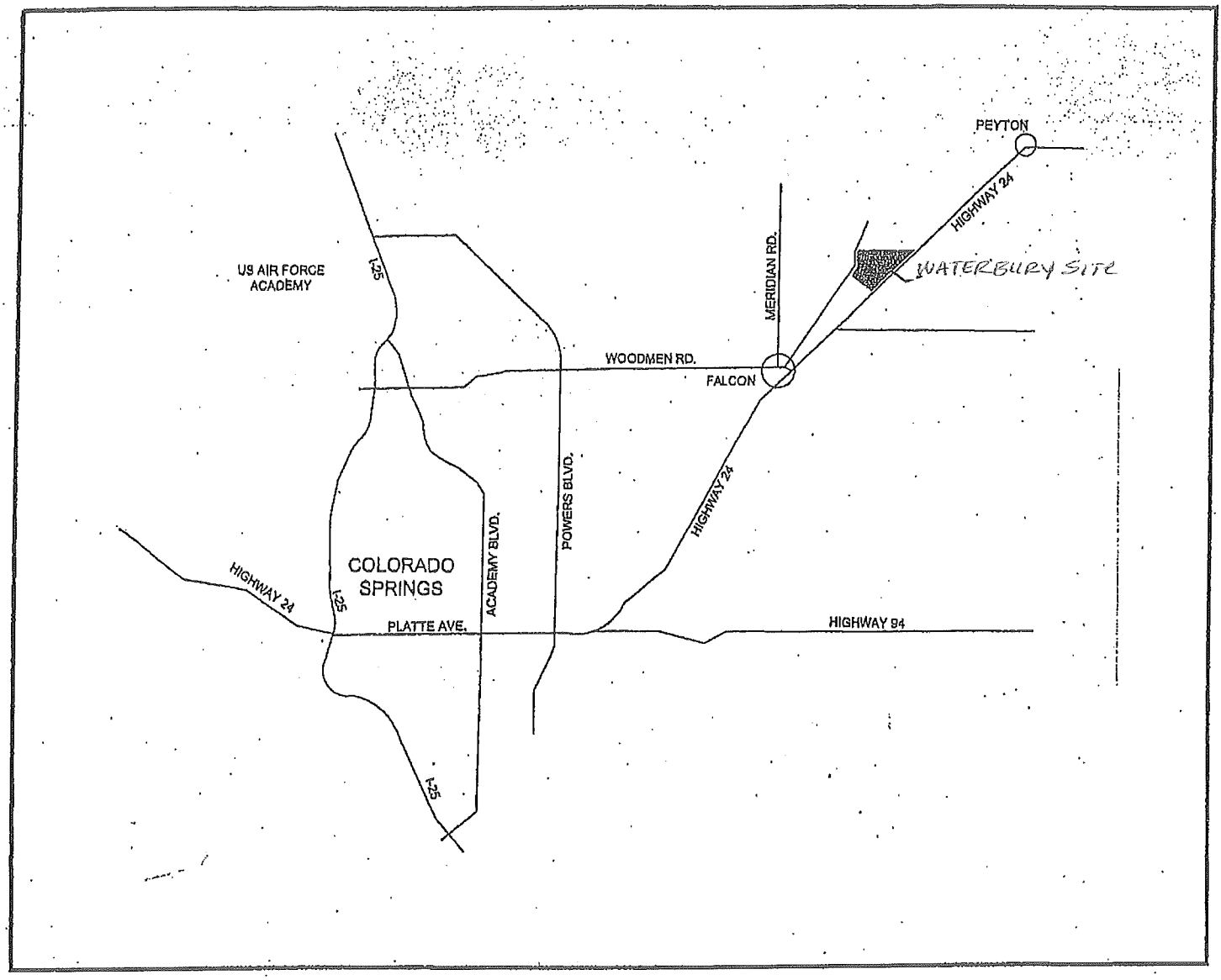
7. "Revision to the MDDP for Meridian Ranch, El Paso County Colorado", by PBS&J, October 2005.

8. "Conceptual Drainage Report for Waterbury (PUD Development Plan)" by Classic Consulting Engineers and Surveyors, LLC dated May, August and November 2012.

9. " Final Drainage Report for Waterbury Filing No. 1" Dated September 2016 by Classic Consulting Engineers and Surveyors, LLC.

# APPENDIX

# VICINITY MAP

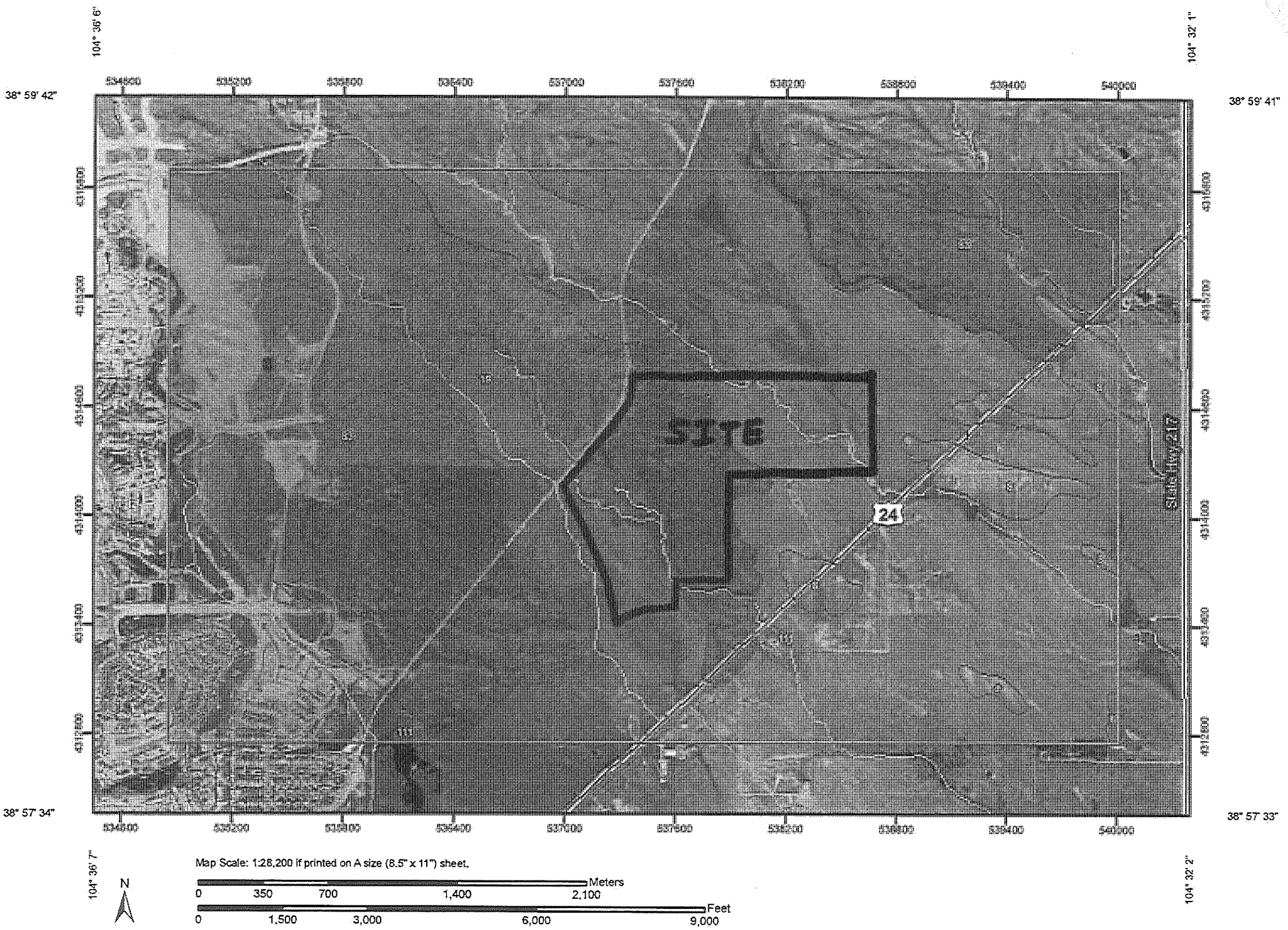



N

# VICINITY MAP

N.T.S.

SOILS MAP (S.C.S. SURVEY)


104° 36' 6"
104° 32' 1"
38° 59' 42"
38° 59' 41"
534800
535200
535600
536000
536400
536800
537200
537600
538000
538400
538800
539200
539600
540000
4315600
4315200
4314800
4314400
4314000
4313600
4313200
4312800
4312400
4312000
24
State Hwy 24
38° 57' 34"
38° 57' 33"
104° 36' 7"
104° 32' 2"
N
Map Scale: 1:28,200 if printed on A size (8.5" x 11") sheet.
Meters
0
350
700
1,400
2,100
Feet
0
1,500
3,000
6,000
9,000

## MAP LEGEND

**Area of Interest (AOI)**

- Area of Interest (AOI)

**Soils**

- Soil Map Units

**Soil Ratings**

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

**Political Features**

- Cities

**Water Features**

- Streams and Canals

**Transportation**

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

## MAP INFORMATION

Map Scale: 1:28,200 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 13N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 8, Apr 6, 2011

Date(s) aerial images were photographed: 7/29/2005; 8/17/2005; 7/2/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

# Hydrologic Soil Group

| Hydrologic Soil Group— Summary by Map Unit — El Paso County Area, Colorado (CO625) | | | | |
|---|---|---|---|---|
| Map unit symbol | Map unit name | Rating | Acres in AOI | Percent of AOI |
| 8 | Blakeland loamy sand, 1 to 9 percent slopes | A | 155.7 | 3.9% |
| 19 | Columbine gravelly sandy loam, 0 to 3 percent slopes | A | 2,095.1 | 52.1% |
| 83 | Stapleton sandy loam, 3 to 8 percent slopes | B | 1,768.2 | 44.0% |
| 111 | Water | | 3.8 | 0.1% |
| Totals for Area of Interest | | | 4,022.9 | 100.0% |

## Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

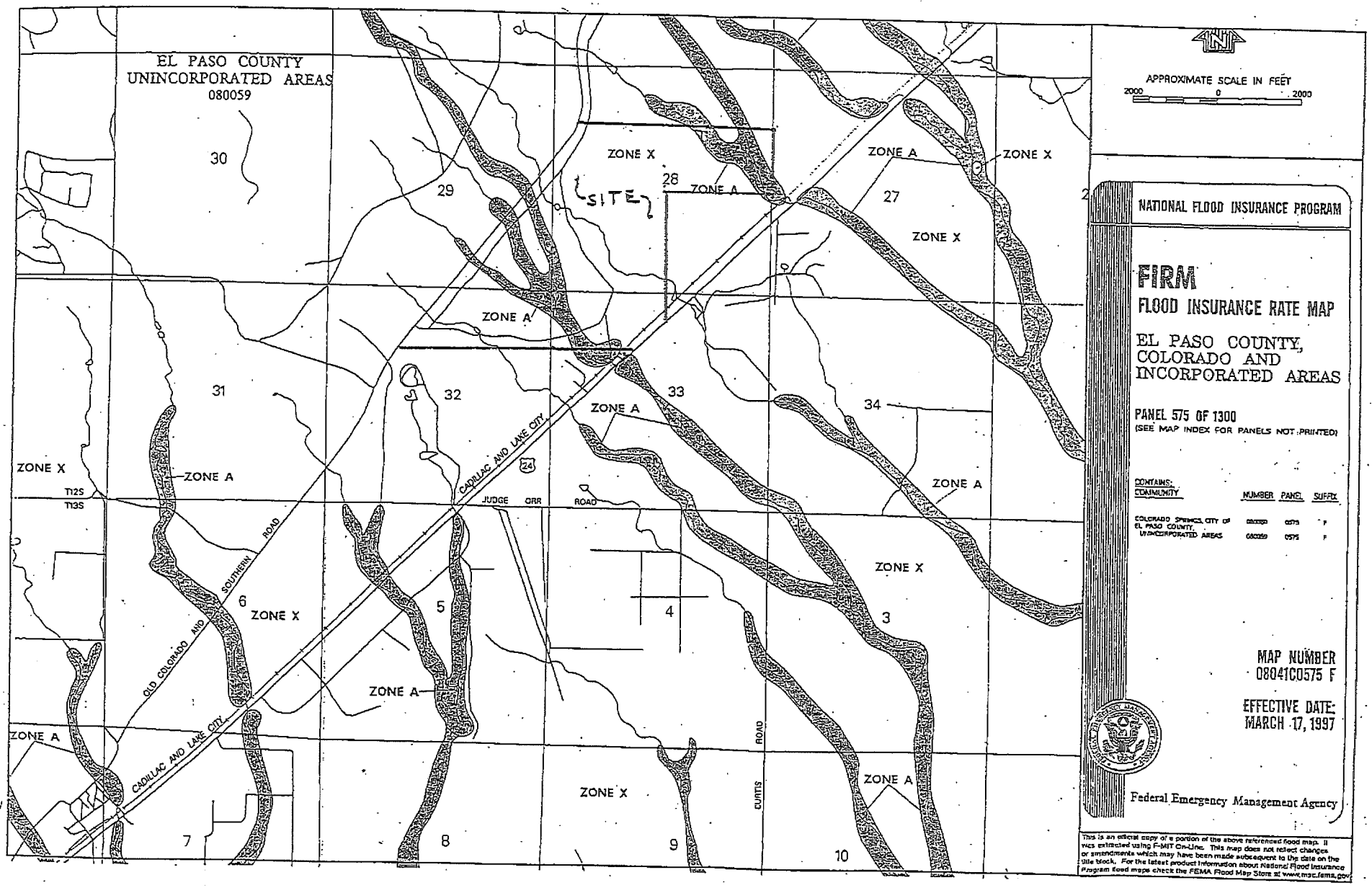
Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

F.E.M.A MAP

CLASSIC
CONSULTING
ENGINEERS & SURVEYORS

F.E.M.A MAP


EL PASO COUNTY
UNINCORPORATED AREAS
080059
APPROXIMATE SCALE IN FEET
2000 0 2000
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO AND INCORPORATED AREAS
PANEL 575 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY
NUMBER
PANEL
SUFFIX
COLORADO SPRINGS, CITY OF
EL PASO COUNTY, UNINCORPORATED AREAS
080059
0575
F
MAP NUMBER
08041C0575 F
EFFECTIVE DATE:
MARCH 17, 1997
Federal Emergency Management Agency
ZONE X
ZONE A
SITE
CADILLAC AND LAKE CITY
JUDGE ORR ROAD
SOUTHERN ROAD
OLD COLORADO AND
CURTIS ROAD
T12S
T13S
30
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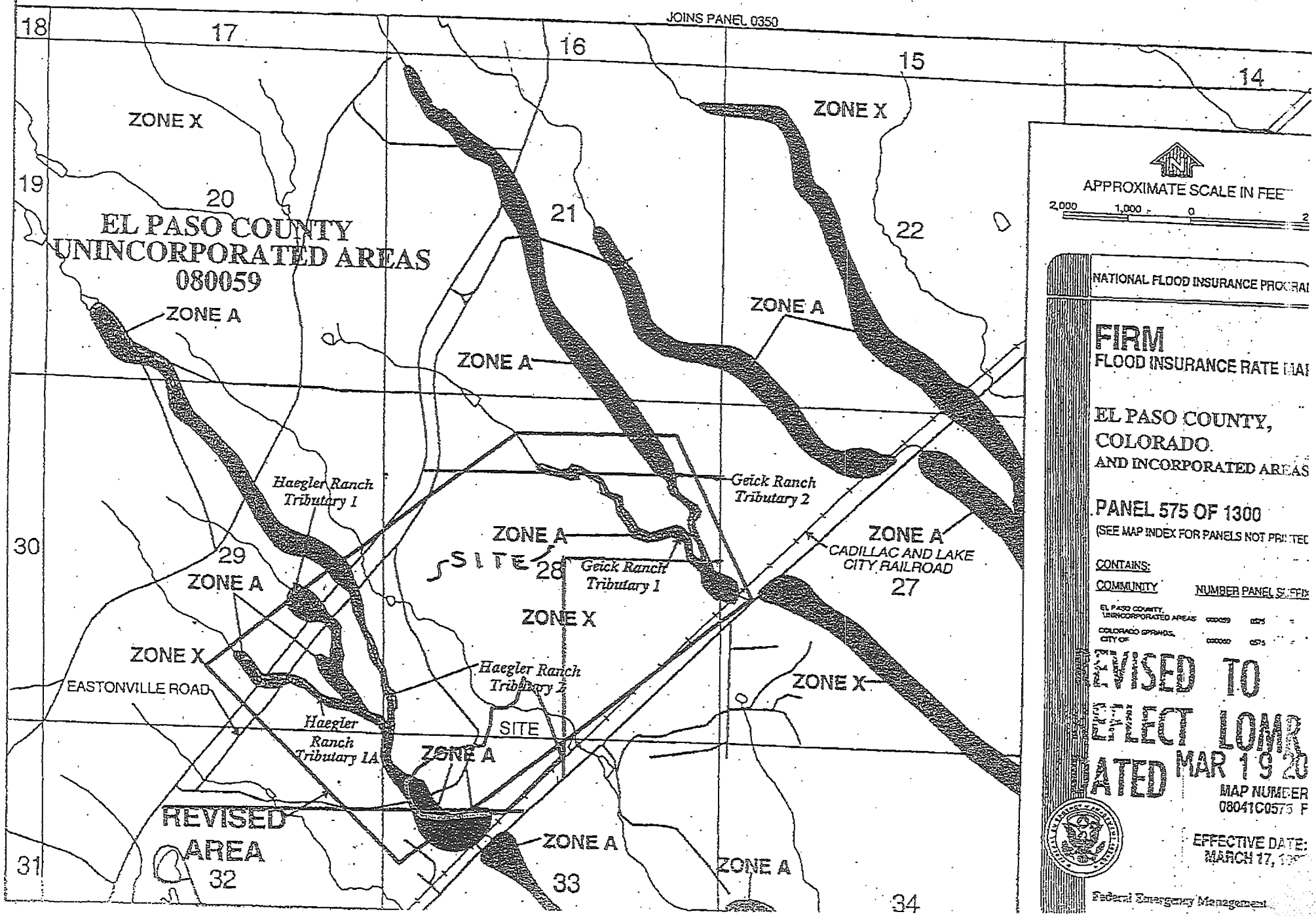
10
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov




APPROXIMATE SCALE IN FEE
2,000 1,000 0 2

NATIONAL FLOOD INSURANCE PROGRAI

# FIRM
FLOOD INSURANCE RATE MAI

EL PASO COUNTY,
COLORADO
AND INCORPORATED AREAS

PANEL 575 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED

CONTAINS:

| COMMUNITY | NUMBER | PANEL | SUFFIX |
|---|---|---|---|
| EL PASO COUNTY, UNINCORPORATED AREAS | 080059 | 0575 | F |
| COLORADO SPRINGS, CITY OF | 080060 | 0575 | F |

REVISED TO
REFLECT LOMR
EFFECTIVE MAR 19 20

MAP NUMBER
08041C0575 F

EFFECTIVE DATE:
MARCH 17, 19

Federal Emergency Management

# ARMY CORP. LETTER

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
Southern Colorado Regulatory Office
200 S. Santa Fe Avenue, Suite 301
Pueblo, Colorado 81003

May 16, 2011

REPLY TO
ATTENTION OF:

Regulatory Division

SUBJECT: Action No. SPA-2005-00801, FOUR-WAY RANCH Subdivision jurisdictional determination.

Peter Martz
Land Resource Group
P.O. Box 50223
Colorado Springs, CO 80949

Dear Mr. Martz:

We received your request for a new jurisdictional determination for the Four-Way Ranch Subdivision. We have assigned Action No. SPA-2005-00801 to this activity. To avoid delay, please include this number in all future correspondence concerning this project.

I reviewed this project site in accordance with Section 404 of the Clean Water Act (CWA) and coordinated the jurisdictional determination with EPA. Under Section 404, the Corps regulates the discharge of dredged and fill material into waters of the United States, including wetlands. Based on your description of the site, other information available to us, and current regulations and policy, we have determined that this site does not contain any jurisdictional waters of the U.S.. Therefore, it will not require Department of the Army authorization under the above laws. However, it is incumbent upon you to remain informed of any changes in the Corps Regulatory Program regulations and policy as they relate to your project.

You may accept or appeal this approved JD or provide new information in accordance with the Notification of Administration Appeal Options and Process and Request for Appeal (NAAOP-RFA). This form is available at http://www.spa.usace.army.mil/reg/Administrative%20Appeals/appeals_process.asp. If you elect to appeal this approved JD, you must complete Section II (Request For Appeal or Objections to an Initial Proffered Permit) of the form and return it to the Army

Engineer Division, South Pacific, CESPD-PDS-O, Attn: Tom Cavanaugh, Administrative Appeal Review Officer, 1455 Market Street, Room 1760, San Francisco, CA 94103-1399 within 60 days of the date of this notice. Failure to notify the Corps within 60 days of the date of this notice means that you accept the approved JD in its entirety and waive all rights to appeal the approved JD.

If you have any questions concerning our regulatory program, please contact me at 719-543-6915 or by e-mail at Van.A.Truan@usace.army.mil. At your convenience, please complete a Customer Service Survey on-line available at http://per2.nwp.usace.army.mil/survey.html.

Sincerely,

Van Truan
Chief, Southern Colorado
Regulatory Branch

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
Southern Colorado Regulatory Office
200 S. Santa Fe Avenue, Suite 301
Pueblo, Colorado 81003

May 16, 2011

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Sincerely,

Van Truan
Chief, Southern Colorado
Regulatory Branch

# HYDROLOGIC/DETENTION CALCULATIONS

CLASSIC SM
CONSULTING
ENGINEERS & SURVEYORS

# HYDROLOGIC/DETENTION CALCULATIONS

# *WATERBURY PHASE 2*
## *(C Summary)*
## *PRELIMINARY DRAINGAE REPORT*

## HISTORIC

| | | DEVELOPED | | | UNDEVELOPED | | | WEIGHTED | | WEIGHTED CA | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BASIN | TOTAL AREA | AREA | C5 | C100 | AREA | C5 | C100 | C5 | C100 | CA5 | CA100 |
| | (Acres) | (Acres) | | | (Acres) | | | | | | |
| OS-1 | 13.30 | 0.00 | 0.57 | 0.67 | 13.30 | 0.25 | 0.35 | 0.25 | 0.35 | 3.325 | 4.655 |
| OS-2 | 3.20 | 0.00 | 0.57 | 0.67 | 3.20 | 0.25 | 0.35 | 0.25 | 0.35 | 0.8 | 1.12 |
| OS-3 | 3.90 | 0.00 | 0.57 | 0.67 | 3.90 | 0.25 | 0.35 | 0.25 | 0.35 | 0.975 | 1.365 |
| OS-4 | 0.50 | 0.00 | 0.57 | 0.67 | 0.50 | 0.25 | 0.35 | 0.25 | 0.35 | 0.125 | 0.175 |
| OS-5 | 1.80 | 0.00 | 0.57 | 0.67 | 1.80 | 0.25 | 0.35 | 0.25 | 0.35 | 0.45 | 0.63 |
| 1 | 52.90 | 0.00 | 0.57 | 0.67 | 52.90 | 0.25 | 0.35 | 0.25 | 0.35 | 13.225 | 18.515 |
| 2 | 7.10 | 0.00 | 0.57 | 0.67 | 7.10 | 0.25 | 0.35 | 0.25 | 0.35 | 1.775 | 2.485 |
| 3 | 0.90 | 0.00 | 0.57 | 0.67 | 0.90 | 0.25 | 0.35 | 0.25 | 0.35 | 0.225 | 0.315 |
| 4 | 15.70 | 0.00 | 0.57 | 0.67 | 15.70 | 0.25 | 0.35 | 0.25 | 0.35 | 3.925 | 5.495 |
| 5 | 3.00 | 0.00 | 0.57 | 0.67 | 3.00 | 0.25 | 0.35 | 0.25 | 0.35 | 0.75 | 1.05 |

## DEVELOPED

| | | DEVELOPED | | | UNDEVELOPED | | | WEIGHTED | | WEIGHTED CA | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BASIN | TOTAL | AREA | C5 | C100 | AREA | C5 | C100 | C5 | C100 | CA5 | CA100 |
| | (Acres) | (Acres) | | | (Acres) | | | | | | |
| OS-1 | 13.30 | 0.00 | 0.57 | 0.67 | 13.30 | 0.25 | 0.35 | 0.25 | 0.35 | 3.325 | 4.655 |
| OS-2 | 3.20 | 0.00 | 0.57 | 0.67 | 3.20 | 0.25 | 0.35 | 0.25 | 0.35 | 0.8 | 1.12 |
| OS-3 | 3.90 | 3.90 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 2.223 | 2.613 |
| OS-4 | 0.50 | 0.50 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 0.285 | 0.335 |
| A | 4.86 | 4.86 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 2.7702 | 3.2562 |
| B | 6.07 | 6.07 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 3.4599 | 4.0669 |
| C | 1.20 | 1.20 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 0.684 | 0.804 |
| D | 1.30 | 1.30 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 0.741 | 0.871 |
| E | 0.63 | 0.63 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 0.3591 | 0.4221 |
| F | 1.37 | 1.37 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 0.7809 | 0.9179 |
| G | 2.41 | 2.41 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 1.3737 | 1.6147 |

# *WATERBURY PHASE 2*
## *(C Summary)*
## *PRELIMINARY DRAINGAE REPORT*

| | | *DEVELOPED* | | | *UNDEVELOPED* | | | *WEIGHTED* | | *WEIGHTED CA* | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BASIN | TOTAL AREA | AREA | C5 | C100 | AREA | C5 | C100 | C5 | C100 | CA5 | CA100 |
| | *(Acres)* | *(Acres)* | | | *(Acres)* | | | | | | |
| *OS5* | 6.67 | 6.67 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 3.8019 | 4.4689 |
| *I* | 2.76 | 2.76 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 1.5732 | 1.8492 |
| *J* | 2.00 | 2.00 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 1.14 | 1.34 |
| *K* | 4.16 | 4.16 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 2.3712 | 2.7872 |
| *L* | 2.85 | 2.85 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 1.6245 | 1.9095 |
| *M* | 0.83 | 0.83 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 0.4731 | 0.5561 |
| *N* | 9.63 | 4.00 | 0.57 | 0.67 | 5.63 | 0.25 | 0.35 | 0.38 | 0.48 | 3.6875 | 4.6505 |
| *O* | 3.51 | 3.51 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 2.0007 | 2.3517 |
| *P* | 1.73 | 1.73 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 0.9861 | 1.1591 |
| *Q* | 5.84 | 5.84 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 3.3288 | 3.9128 |
| *R* | 1.86 | 1.86 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 1.0602 | 1.2462 |
| *S* | 6.86 | 3.00 | 0.57 | 0.67 | 3.88 | 0.25 | 0.35 | 0.39 | 0.49 | 2.68 | 3.368 |
| *T* | 1.30 | 1.30 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 0.741 | 0.871 |
| *U* | 4.29 | 4.29 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 2.4453 | 2.8743 |
| *V* | 3.68 | 3.68 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 2.0976 | 2.4656 |
| *W* | 2.08 | 2.08 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 1.1856 | 1.3936 |
| *X* | 1.18 | 1.18 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 0.6726 | 0.7906 |
| *Y* | 4.31 | 4.31 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 2.4567 | 2.8877 |
| *Z* | 3.75 | 3.75 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 2.1375 | 2.5125 |
| *AA* | 1.53 | 1.53 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 0.8721 | 1.0251 |
| *BB* | 1.87 | 1.87 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 1.0659 | 1.2529 |
| *CC* | 1.54 | 0.54 | 0.57 | 0.67 | 1.00 | 0.25 | 0.35 | 0.36 | 0.46 | 0.5578 | 0.7118 |
| *DD* | 0.79 | 0.79 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 0.4503 | 0.5293 |

# *WATERBURY PHASE 2 PRELIMINARY DRAINAGE REPORT*
# *TIME OF CONCENTRATION SUMMARY*

| *HISTORIC* | | *WEIGHTED* | | *OVERLAND* | | | | *STREET / CHANNEL FLOW* | | | | $T_t$ | *INTENSITY* | | *TOTAL FLOWS* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BASIN | AREA TOTAL *(Acres)* | $C_5$ | $C_{100}$ | $C_5$ | Length *(ft)* | Height *(ft)* | $T_C$ *(min)* | Length *(ft)* | Slope *(%)* | Velocity *(fps)* | $T_t$ *(min)* | TOTAL *(min)* | $I_5$ *(in/hr)* | $I_{100}$ *(in/hr)* | $Q_5$ *(c.f.s.)* | $Q_{100}$ *(c.f.s.)* |
| | | * For Calcs See Runoff Summary | | | | | | | | | | | | | | |
| *OS-1* | 13.30 | 0.57 | 0.67 | 0.25 | 300 | 8.0 | 19.9 | 617 | 3.9% | 1.3 | 8.2 | 28.1 | 2.6 | 4.2 | 19.5 | 37.5 |
| *OS-2* | 3.20 | 0.57 | 0.67 | 0.25 | 300 | 10.0 | 18.5 | 631 | 0.6% | 0.5 | 21.0 | 39.5 | 2.1 | 3.4 | 3.9 | 7.3 |
| *OS-3* | 3.90 | 0.57 | 0.67 | 0.25 | 300 | 28.0 | 13.2 | 0 | 1.0% | 0.1 | 0.0 | 13.2 | 3.7 | 6.3 | 8.1 | 16.4 |
| *OS-4* | 0.50 | 0.57 | 0.67 | 0.25 | 208 | 10.0 | 13.7 | 0 | 1.0% | 0.1 | 0.0 | 13.7 | 3.6 | 6.2 | 1.0 | 2.1 |
| *OS-5* | 1.80 | 0.57 | 0.67 | 0.25 | 193 | 6.0 | 15.2 | 0 | 1.0% | 0.1 | 0.0 | 15.2 | 3.5 | 5.9 | 3.5 | 7.1 |
| *1* | 52.90 | 0.57 | 0.67 | 0.25 | 300 | 30.0 | 12.9 | 2216 | 6.7% | 2.0 | 18.5 | 31.3 | 2.4 | 3.9 | 73.0 | 139.8 |
| *2* | 7.10 | 0.38 | 0.48 | 0.25 | 300 | 18.0 | 15.2 | 756 | 1.8% | 1.0 | 12.6 | 27.8 | 2.6 | 4.2 | 7.0 | 14.5 |
| *3* | 0.90 | 0.57 | 0.67 | 0.25 | 207 | 10.0 | 13.6 | 0 | 1.0% | 0.1 | 0.0 | 13.6 | 3.6 | 6.2 | 1.9 | 3.7 |
| *4* | 15.70 | 0.57 | 0.67 | 0.25 | 300 | 14.0 | 16.6 | 1496 | 1.5% | 0.9 | 29.3 | 45.9 | 1.9 | 3.1 | 17.4 | 32.7 |
| *5* | 3.00 | 0.57 | 0.67 | 0.25 | 300 | 6.0 | 21.9 | 350 | 2.8% | 1.2 | 4.9 | 26.8 | 2.6 | 4.3 | 4.5 | 8.7 |

| *DEVELOPED* | | *WEIGHTED* | | *OVERLAND* | | | | *STREET / CHANNEL FLOW* | | | | $T_t$ | *INTENSITY* | | *TOTAL FLOWS* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BASIN | AREA TOTAL *(Acres)* | $C_5$ | $C_{100}$ | $C_5$ | Length *(ft)* | Height *(ft)* | $T_C$ *(min)* | Length *(ft)* | Slope *(%)* | Velocity *(fps)* | $T_t$ *(min)* | TOTAL *(min)* | $I_5$ *(in/hr)* | $I_{100}$ *(in/hr)* | $Q_5$ *(c.f.s.)* | $Q_{100}$ *(c.f.s.)* |
| | | * For Calcs See Runoff Summary | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| *OS-1* | 13.30 | 0.25 | 0.35 | 0.25 | 300 | 8.0 | 19.9 | 617 | 3.9% | 1.3 | 7.9 | 27.8 | 2.6 | 4.2 | 8.6 | 19.7 |
| *OS-2* | 3.20 | 0.25 | 0.35 | 0.25 | 300 | 10.0 | 18.5 | 631 | 2.0% | 0.5 | 21.0 | 39.5 | 2.1 | 3.4 | 1.7 | 3.8 |
| *OS-3* | 3.90 | 0.57 | 0.67 | 0.25 | 120 | 2.4 | 13.9 | 300 | 8.0% | 1.8 | 2.9 | 16.7 | 3.3 | 5.6 | 7.4 | 14.6 |
| *OS-4* | 0.50 | 0.57 | 0.67 | 0.25 | 200 | 6.0 | 15.6 | 0 | 0.0% | 0.1 | 0.0 | 15.6 | 3.4 | 5.8 | 1.0 | 1.9 |
| *A* | 4.86 | 0.57 | 0.67 | 0.25 | 120 | 2.4 | 13.9 | 1400 | 1.0% | 2.0 | 11.7 | 25.5 | 2.7 | 4.4 | 7.5 | 14.5 |
| *B* | 6.07 | 0.57 | 0.67 | 0.25 | 200 | 3.0 | 19.7 | 900 | 2.0% | 3.0 | 5.0 | 24.7 | 2.7 | 4.5 | 9.5 | 18.4 |
| *C* | 1.20 | 0.57 | 0.67 | 0.25 | 300 | 4.0 | 25.0 | 100 | 2.0% | 3.0 | 0.6 | 25.6 | 2.7 | 4.4 | 1.8 | 3.6 |
| *D* | 1.30 | 0.57 | 0.67 | 0.25 | 50 | 2.0 | 7.1 | 1050 | 1.0% | 2.0 | 8.8 | 15.9 | 3.4 | 5.7 | 2.5 | 5.0 |
| *E* | 0.63 | 0.57 | 0.67 | 0.25 | 50 | 2.0 | 7.1 | 500 | 2.0% | 3.0 | 2.8 | 9.9 | 4.1 | 7.1 | 1.5 | 3.0 |

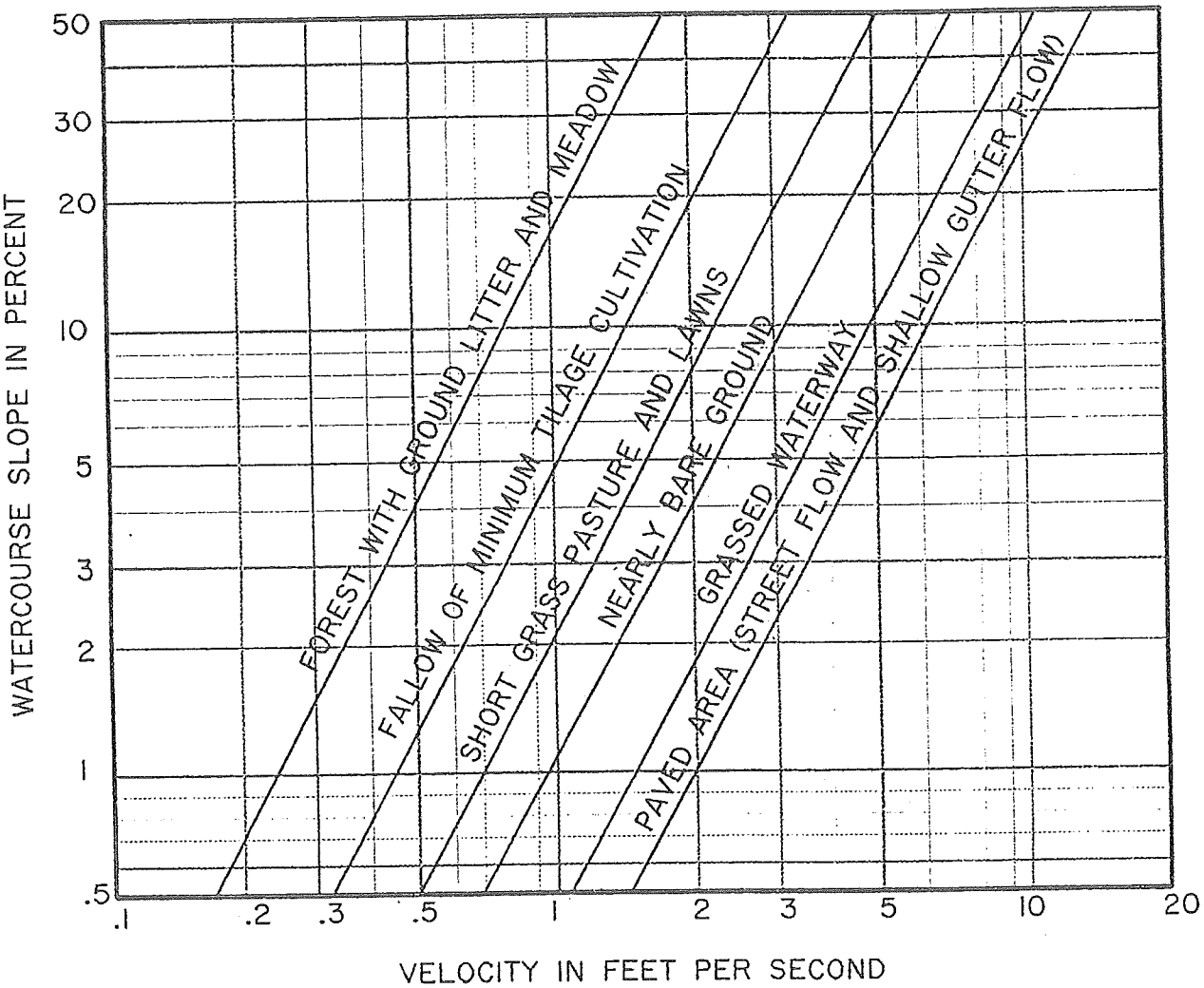
Calculated by: LD

Date: 7/4/2017

# *WATERBURY PHASE 2 PRELIMINARY DRAINAGE REPORT*
# *TIME OF CONCENTRATION SUMMARY*

| *HISTORIC* | | *WEIGHTED* | | *OVERLAND* | | | | *STREET / CHANNEL FLOW* | | | | $T_t$ | *INTENSITY* | | *TOTAL FLOWS* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BASIN | AREA TOTAL *(Acres)* | $C_5$ | $C_{100}$ | $C_5$ | Length *(ft)* | Height *(ft)* | $T_C$ *(min)* | Length *(ft)* | Slope *(%)* | Velocity *(fps)* | $T_t$ *(min)* | TOTAL *(min)* | $I_5$ *(in/hr)* | $I_{100}$ *(in/hr)* | $Q_5$ *(c.f.s.)* | $Q_{100}$ *(c.f.s.)* |
| | | * For Calcs See Runoff Summary | | | | | | | | | | | | | | |
| *F* | 1.37 | 0.57 | 0.67 | 0.25 | 150 | 4.0 | 14.1 | 500 | 2.0% | 3.0 | 2.8 | 16.9 | 3.3 | 5.6 | 2.6 | 5.1 |
| *G* | 2.41 | 0.57 | 0.67 | 0.25 | 100 | 2.0 | 12.6 | 900 | 2.0% | 3.0 | 5.0 | 17.6 | 3.2 | 5.4 | 4.4 | 8.8 |
| *OS5* | 6.67 | 0.57 | 0.67 | 0.25 | 200 | 4.0 | 17.9 | 820 | 2.0% | 3.0 | 4.6 | 22.4 | 2.9 | 4.8 | 11.0 | 21.4 |
| *I* | 2.76 | 0.57 | 0.67 | 0.25 | 200 | 4.0 | 17.9 | 700 | 1.4% | 2.5 | 4.7 | 22.5 | 2.9 | 4.8 | 4.5 | 8.8 |
| *J* | 2.00 | 0.57 | 0.67 | 0.25 | 50 | 2.0 | 7.1 | 600 | 2.0% | 3.0 | 3.3 | 10.4 | 4.0 | 6.9 | 4.6 | 9.3 |
| *K* | 4.16 | 0.57 | 0.67 | 0.25 | 500 | 14.0 | 25.3 | 100 | 2.0% | 3.0 | 0.6 | 25.9 | 2.7 | 4.4 | 6.4 | 12.3 |
| *L* | 2.85 | 0.57 | 0.67 | 0.25 | 50 | 2.0 | 7.1 | 1400 | 1.8% | 3.0 | 7.8 | 14.9 | 3.5 | 5.9 | 5.7 | 11.3 |
| *M* | 0.83 | 0.57 | 0.67 | 0.25 | 100 | 2.0 | 12.6 | 300 | 2.0% | 3.0 | 1.7 | 14.3 | 3.5 | 6.0 | 1.7 | 3.4 |
| *N* | 9.63 | 0.38 | 0.48 | 0.25 | 300 | 8.0 | 19.9 | 900 | 2.0% | 3.0 | 5.0 | 24.9 | 2.7 | 4.5 | 10.1 | 21.0 |
| *O* | 3.51 | 0.57 | 0.67 | 0.25 | 150 | 2.0 | 17.7 | 710 | 2.0% | 3.0 | 3.9 | 21.6 | 2.9 | 4.9 | 5.9 | 11.5 |
| *P* | 1.73 | 0.57 | 0.67 | 0.25 | 50 | 1.0 | 8.9 | 900 | 2.0% | 3.0 | 5.0 | 13.9 | 3.6 | 6.1 | 3.5 | 7.1 |
| *Q* | 5.84 | 0.57 | 0.67 | 0.25 | 300 | 6.0 | 21.9 | 1100 | 2.0% | 3.0 | 6.1 | 28.0 | 2.6 | 4.2 | 8.6 | 16.5 |
| *R* | 1.86 | 0.57 | 0.67 | 0.25 | 200 | 2.0 | 22.5 | 1200 | 2.0% | 3.0 | 6.7 | 29.1 | 2.5 | 4.1 | 2.7 | 5.1 |
| *S* | 6.86 | 0.39 | 0.49 | 0.25 | 300 | 6.0 | 21.9 | 500 | 2.0% | 3.0 | 2.8 | 24.7 | 2.7 | 4.5 | 7.4 | 15.3 |
| *T* | 1.30 | 0.57 | 0.67 | 0.25 | 200 | 4.0 | 17.9 | 700 | 1.5% | 2.5 | 4.7 | 22.5 | 2.9 | 4.8 | 2.1 | 4.2 |
| *U* | 4.29 | 0.57 | 0.67 | 0.25 | 300 | 6.0 | 21.9 | 700 | 2.0% | 3.0 | 3.9 | 25.8 | 2.7 | 4.4 | 6.6 | 12.7 |
| *V* | 3.68 | 0.57 | 0.67 | 0.25 | 300 | 6.0 | 21.9 | 300 | 2.0% | 3.0 | 1.7 | 23.6 | 2.8 | 4.7 | 5.9 | 11.5 |
| *W* | 2.08 | 0.57 | 0.67 | 0.25 | 300 | 10.0 | 18.5 | 300 | 3.0% | 5.0 | 1.0 | 19.5 | 3.1 | 5.2 | 3.7 | 7.2 |
| *X* | 1.18 | 0.57 | 0.67 | 0.25 | 50 | 1.0 | 8.9 | 900 | 2.8% | 5.0 | 3.0 | 11.9 | 3.8 | 6.6 | 2.6 | 5.2 |
| *Y* | 4.31 | 0.57 | 0.67 | 0.25 | 300 | 6.0 | 21.9 | 100 | 3.0% | 5.0 | 0.3 | 22.2 | 2.9 | 4.8 | 7.1 | 13.9 |
| *Z* | 3.75 | 0.57 | 0.67 | 0.25 | 300 | 6.0 | 21.9 | 600 | 2.0% | 3.0 | 3.3 | 25.2 | 2.7 | 4.5 | 5.8 | 11.3 |
| *AA* | 1.53 | 0.57 | 0.67 | 0.25 | 300 | 10.0 | 18.5 | 500 | 3.0% | 5.0 | 1.7 | 20.2 | 3.0 | 5.1 | 2.6 | 5.2 |
| *BB* | 1.87 | 0.57 | 0.67 | 0.25 | 100 | 2.0 | 12.6 | 900 | 2.0% | 3.0 | 5.0 | 17.6 | 3.2 | 5.4 | 3.4 | 6.8 |
| *CC* | 1.54 | 0.36 | 0.46 | 0.25 | 300 | 6.0 | 21.9 | 400 | 1.8% | 3.0 | 2.2 | 24.1 | 2.8 | 4.6 | 1.6 | 3.3 |
| *DD* | 0.79 | 0.57 | 0.67 | 0.25 | 50 | 1.0 | 8.9 | 800 | 2.0% | 3.0 | 4.4 | 13.4 | 3.6 | 6.2 | 1.6 | 3.3 |

# TRAVEL VELOCITY OF CONCENTRATED FLOW



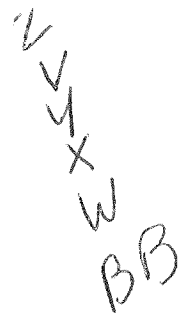

| | | | |
|---|---|---|---|
| CITY OF PUEBLO, COLORADO | REFERENCE: | Urban Hydrology for Small Watersheds 1975 | DATE: 6/97 |
| STORM DRAINAGE DESIGN CRITERIA | FIG. 3.2 | RUNOFF | SHT. NO.: A-5 |

30" @ 1% 37 cfs 75% full

36" 60 cfs

42" 92 cfs

48" 131 cfs




[illegible] cfs (8)

62 cfs (7)

82 cfs

151

**WATERBURY PHASE 2**
**PRELIMINARY DRAINAGE REPORT**
**BASIN ROUTING SUMMARY**
**PROPOSED CONDITION**

| Design Point(s) | Contributing Basins | Equivalent $CA_5$ | Equivalent $CA_{100}$ | Maximum $T_C$ | Intensity $I_5$ | Intensity $I_{100}$ | Flow $Q_5$ | Flow $Q_{100}$ |
|---|---|---|---|---|---|---|---|---|
| OS-1 | OS1 | 3.325 | 4.655 | 27.8 | 2.6 | 4.2 | 8.6 | 19.7 |
| OS-2 | OS2 and D | 1.541 | 1.991 | 39.5 | 2.1 | 3.4 | 3.3 | 6.8 |
| OS-3 | OS3 | 2.223 | 2.613 | 16.7 | 3.3 | 5.6 | 7.4 | 14.6 |
| OS-4 | OS4 | 0.285 | 0.335 | 15.6 | 3.4 | 5.8 | 1.0 | 1.9 |
| A | A | 2.7702 | 3.2562 | 25.5 | 2.7 | 4.4 | 7.5 | 14.5 |
| B | B | 3.4599 | 4.0669 | 24.7 | 2.7 | 4.5 | 9.5 | 18.4 |
| C | C AND OS1 | 4.009 | 5.459 | 27.8 | 2.6 | 4.2 | 10.4 | 23.1 |
| D | D | 0.741 | 0.871 | 15.9 | 3.4 | 5.7 | 2.5 | 5.0 |
| E | E AND OS3 | 2.5821 | 3.0351 | 16.9 | 3.3 | 5.6 | 8.5 | 16.9 |
| F | F and E and OS3 | 3.363 | 3.953 | 16.9 | 3.3 | 5.6 | 11.1 | 22.0 |
| G | G AND B | 4.8336 | 5.6816 | 17.6 | 3.2 | 5.4 | 15.6 | 30.9 |
| OS5 | OS5 | 3.8019 | 4.4689 | 22.4 | 2.9 | 4.8 | 11.0 | 21.4 |
| I | I | 1.5732 | 1.8492 | 22.5 | 2.9 | 4.8 | 4.5 | 8.8 |
| J | J | 1.14 | 1.34 | 10.4 | 4.0 | 6.9 | 4.6 | 9.3 |
| K | K | 2.3712 | 2.7872 | 25.9 | 2.7 | 4.4 | 6.4 | 12.3 |
| L | L | 1.6245 | 1.9095 | 14.9 | 3.5 | 5.9 | 5.7 | 11.3 |
| M | M | 0.4731 | 0.5561 | 14.3 | 3.5 | 6.0 | 1.7 | 3.4 |
| N | N | 3.6875 | 4.6505 | 24.9 | 2.7 | 4.5 | 10.1 | 21.0 |
| O | O | 2.0007 | 2.3517 | 21.6 | 2.9 | 4.9 | 5.9 | 11.5 |
| P | P | 0.9861 | 1.1591 | 13.9 | 3.6 | 6.1 | 3.5 | 7.1 |
| Q | Q | 3.3288 | 3.9128 | 28.0 | 2.6 | 4.2 | 8.6 | 16.5 |
| R | R | 1.0602 | 1.2462 | 29.1 | 2.5 | 4.1 | 2.7 | 5.1 |
| S | S | 2.68 | 3.368 | 24.7 | 2.7 | 4.5 | 7.4 | 15.3 |
| T | T | 0.741 | 0.871 | 22.5 | 2.9 | 4.8 | 2.1 | 4.2 |
| U | U | 3.1863 | 3.7453 | 25.8 | 2.7 | 4.4 | 8.6 | 16.6 |
| V | V | 2.0976 | 2.4656 | 23.6 | 2.8 | 4.7 | 5.9 | 11.5 |
| W | Z,V,Y,X,W,BB | 9.6159 | 11.3029 | 24.0 | 2.8 | 4.6 | 26.8 | 52.1 |
| X | X | 0.6726 | 0.7906 | 11.9 | 3.8 | 6.6 | 2.6 | 5.2 |
| Y | Y | 2.4567 | 2.8877 | 22.2 | 2.9 | 4.8 | 7.1 | 13.9 |
| Z | Z | 2.1375 | 2.5125 | 25.2 | 2.7 | 4.5 | 5.8 | 11.3 |
| AA | AA | 0.8721 | 1.0251 | 20.2 | 3.0 | 5.1 | 2.6 | 5.2 |
| BB | BB | 1.0659 | 1.2529 | 17.6 | 3.2 | 5.4 | 3.4 | 6.8 |
| CC | D | 0.5578 | 0.7118 | 24.1 | 2.8 | 4.6 | 1.6 | 3.3 |
| DD | DD | 0.4503 | 0.5293 | 13.4 | 3.6 | 6.2 | 1.6 | 3.3 |

Date: 7/27/2017
Checked by: LD

# WATERBURY PHASE 2
# PDR
# PIPE ROUTING SUMMARY

| Pipe Run(s) | Contributing Design Points | Equivalent $CA_5$ | Equivalent $CA_{100}$ | Maximum $T_C$ | Intensity | | Flow | |
|---|---|---|---|---|---|---|---|---|
| | | | | | $I_5$ | $I_{100}$ | $Q_5$ | $Q_{100}$ |
| 1 | C | 4.01 | 5.46 | 27.8 | 2.6 | 4.2 | 10.4 | 23.1 |
| 2 | E | 2.58 | 3.04 | 16.9 | 3.3 | 5.6 | 8.5 | 16.9 |
| 3 | F and E | 5.95 | 6.99 | 18.0 | 3.2 | 5.4 | 19.0 | 37.6 |
| 4 | G and F | 10.78 | 12.67 | 25.0 | 2.7 | 4.5 | 29.4 | 57.0 |
| 5 | K and Pipe Run 4 | 13.15 | 15.46 | 27.0 | 2.6 | 4.3 | 34.5 | 66.6 |
| 6 | J I OS5 OS4 | 6.80 | 7.99 | 22.4 | 2.9 | 4.8 | 19.6 | 38.3 |
| 7 | W | 9.62 | 11.30 | 25.0 | 2.7 | 4.5 | 26.3 | 50.9 |
| 8 | T U | 3.93 | 4.62 | 26.0 | 2.7 | 4.4 | 10.5 | 20.3 |
| 9 | PR-7 & PR-8 | 13.54 | 15.92 | 26.0 | 2.7 | 4.4 | 36.2 | 70.1 |

Calculated by: LD

Date: 7/27/2017

Checked by: _____

# Free Online Manning Pipe Flow Calculator

## Manning Formula Uniform Pipe Flow at Given Slope and Depth

Can you help me translate, program, or host these calculators? (../contact.php) [Hide this request]

Check out our newest spreadsheet update: Download Spreadsheet (spreadsheet/Manning-Pipe-Flow.ods) Open Google Sheets version (spreadsheet/Manning-Pipe-Flow.php) View All Spreadsheets (http://www.hawsedc.com/engcalcs/SpreadsheetLibrary.php)

## Printable Title

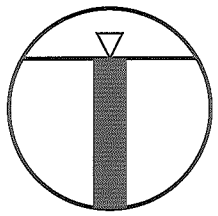
### Printable Subtitle

Set units: m mm ft in

| | | |
|---|---|---|
| **Pipe diameter, $d_0$** | 30 | in |
| **Manning roughness, n ? (http://www.engineeringtoolbox.com/mannings-roughness-d_799.html)** | 0.013 | |
| **Pressure slope (possibly ? (../pressureslope.php) equal to pipe slope), $S_0$** | 1 | % rise/run |
| **Percent of (or ratio to) full depth (100% or 1 if flowing full)** | 75 | % |

Results

| | | |
|---|---|---|
| **Flow, Q** | 37.3990 | cfs |
| **Velocity, v** | 9.4706 | ft/sec |
| **Velocity head, $h_v$** | 1.3940 | ft |
| **Flow area** | 3.9491 | ft^2 |
| **Wetted perimeter** | 5.2359 | ft |
| **Hydraulic radius** | 0.7542 | ft |
| **Top width, T** | 2.1650 | ft |
| **Froude number, F** | 1.24 | |
| **Shear stress (tractive force), tau** | 56.0414 | N/m^2 |



# Free Online Manning Pipe Flow Calculator

## Manning Formula Uniform Pipe Flow at Given Slope and Depth

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Check out our newest spreadsheet update: Download Spreadsheet (spreadsheet/Manning-Pipe-Flow.ods) Open Google Sheets version (spreadsheet/Manning-Pipe-Flow.php) View All Spreadsheets (http://www.hawsedc.com/engcalcs/SpreadsheetLibrary.php)

## Printable Title

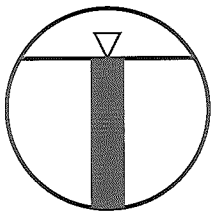
### Printable Subtitle

Set units: m mm ft in

| | | |
|---|---|---|
| **Pipe diameter, $d_0$** | 36 | in |
| **Manning roughness, n ? (http://www.engineeringtoolbox.com/mannings-roughness-d_799.html)** | 0.013 | |
| **Pressure slope (possibly ? (../pressureslope.php) equal to pipe slope), $S_0$** | 1 | % rise/run |
| **Percent of (or ratio to) full depth (100% or 1 if flowing full)** | 75 | % |

Results

| | | |
|---|---|---|
| **Flow, Q** | 60.8149 | cfs |
| **Velocity, v** | 10.6946 | ft/sec |
| **Velocity head, $h_v$** | 1.7776 | ft |
| **Flow area** | 5.6867 | ft^2 |
| **Wetted perimeter** | 6.2831 | ft |
| **Hydraulic radius** | 0.9051 | ft |
| **Top width, T** | 2.5980 | ft |
| **Froude number, F** | 1.27 | |
| **Shear stress (tractive force), tau** | 67.2497 | N/m^2 |



# Free Online Manning Pipe Flow Calculator

## Manning Formula Uniform Pipe Flow at Given Slope and Depth

Can you help me translate, program, or host these calculators? (../contact.php) [Hide this request]

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## Printable Title

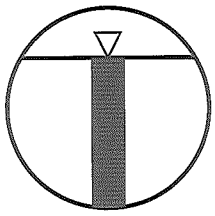
### Printable Subtitle

Set units: m mm ft in

| | | |
|---|---|---|
| **Pipe diameter, $d_0$** | 48 | in |
| **Manning roughness, n ? (http://www.engineeringtoolbox.com/mannings-roughness-d_799.html)** | 0.013 | |
| **Pressure slope (possibly ? (../pressureslope.php) equal to pipe slope), $S_0$** | 1 | % rise/run |
| **Percent of (or ratio to) full depth (100% or 1 if flowing full)** | 75 | % |

Results

| | | |
|---|---|---|
| **Flow, Q** | 130.9724 | cfs |
| **Velocity, v** | 12.9556 | ft/sec |
| **Velocity head, $h_v$** | 2.6086 | ft |
| **Flow area** | 10.1098 | ft^2 |
| **Wetted perimeter** | 8.3775 | ft |
| **Hydraulic radius** | 1.2067 | ft |
| **Top width, T** | 3.4641 | ft |
| **Froude number, F** | 1.34 | |
| **Shear stress (tractive force), tau** | 89.6662 | N/m^2 |



# CONCEPTUAL DRAINGE REPORT AND POND CALCULATIONS BY CLASSIC CONSULTING

JOB NAME: *WATERBURY PDR*
JOB NUMBER: *2359.00*
DATE: *11/28/12*
CALCULATED BY: *MAW*

## PRELIMINARY DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY

| BASIN | TOTAL AREA (AC) | IMPERVIOUS AREA / STREETS | | | LANDSCAPE/UNDEVELOPED AREAS | | | WEIGHTED | | WEIGHTED CA | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AREA (AC) | C(5) | C(100) | AREA (AC) | C(5) | C(100) | C(5) | C(100) | CA(5) | CA(100) |
| A1 | 10.50 | 5.00 | 0.55 | 0.65 | 5.50 | 0.25 | 0.35 | 0.39 | 0.49 | 4.13 | 5.18 |
| A2 | 2.60 | 1.60 | 0.57 | 0.67 | 1.00 | 0.25 | 0.35 | 0.45 | 0.55 | 1.16 | 1.42 |
| A3 | 7.90 | 7.90 | 0.57 | 0.67 | 0.00 | 0.25 | 0.35 | 0.57 | 0.67 | 4.50 | 5.29 |
| A4 | 2.20 | 2.20 | 0.55 | 0.65 | 0.00 | 0.25 | 0.35 | 0.55 | 0.65 | 1.21 | 1.43 |
| A5 | 5.70 | 5.70 | 0.60 | 0.70 | 0.00 | 0.25 | 0.35 | 0.60 | 0.70 | 3.42 | 3.99 |
| A6 | 5.20 | 5.20 | 0.55 | 0.65 | 0.00 | 0.25 | 0.35 | 0.55 | 0.65 | 2.86 | 3.38 |
| A7 | 2.20 | 1.20 | 0.55 | 0.65 | 1.00 | 0.25 | 0.35 | 0.41 | 0.51 | 0.91 | 1.13 |
| | | | | | | | | | | | |
| B1 | 5.60 | 5.60 | 0.55 | 0.65 | 0.00 | 0.25 | 0.35 | 0.55 | 0.65 | 3.08 | 3.64 |
| B2 | 16.00 | 16.00 | 0.55 | 0.65 | 0.00 | 0.25 | 0.35 | 0.55 | 0.65 | 8.80 | 10.40 |
| B3 | 9.00 | 5.00 | 0.55 | 0.65 | 4.00 | 0.25 | 0.35 | 0.42 | 0.52 | 3.75 | 4.65 |
| B4 | 1.60 | 1.60 | 0.55 | 0.65 | 0.00 | 0.25 | 0.35 | 0.55 | 0.65 | 0.88 | 1.04 |
| B5 | 4.70 | 4.70 | 0.55 | 0.65 | 0.00 | 0.25 | 0.35 | 0.55 | 0.65 | 2.59 | 3.06 |
| B6 | 2.20 | 2.20 | 0.60 | 0.70 | 0.00 | 0.25 | 0.35 | 0.60 | 0.70 | 1.32 | 1.54 |
| B7 | 8.40 | 8.40 | 0.60 | 0.70 | 0.00 | 0.25 | 0.35 | 0.60 | 0.70 | 5.04 | 5.88 |
| B8 | 8.10 | 8.10 | 0.55 | 0.65 | 0.00 | 0.25 | 0.35 | 0.55 | 0.65 | 4.46 | 5.27 |
| B9 | 7.40 | 7.40 | 0.55 | 0.65 | 0.00 | 0.25 | 0.35 | 0.55 | 0.65 | 4.07 | 4.81 |
| B10 | 3.00 | 1.00 | 0.75 | 0.80 | 2.00 | 0.55 | 0.65 | 0.62 | 0.70 | 1.85 | 2.10 |
| B11 | 5.70 | 3.70 | 0.55 | 0.65 | 2.00 | 0.25 | 0.35 | 0.44 | 0.54 | 2.54 | 3.11 |
| B12 | 6.00 | 6.00 | 0.58 | 0.68 | 0.00 | 0.25 | 0.35 | 0.58 | 0.68 | 3.48 | 4.08 |
| B13 | 3.60 | 3.60 | 0.55 | 0.65 | 0.00 | 0.25 | 0.35 | 0.55 | 0.65 | 1.98 | 2.34 |
| B14 | 7.20 | 4.20 | 0.55 | 0.65 | 3.00 | 0.25 | 0.35 | 0.43 | 0.53 | 3.06 | 3.78 |
| B15 | 1.40 | 1.00 | 0.55 | 0.65 | 0.40 | 0.25 | 0.35 | 0.46 | 0.56 | 0.65 | 0.79 |

JOB NAME: *WATERBURY PDR*
JOB NUMBER: *2359.00*
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CALCULATED BY: *MAW*

## PRELIMINARY DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY

| BASIN | TOTAL AREA (AC) | IMPERVIOUS AREA / STREETS | | | LANDSCAPE/UNDEVELOPED AREAS | | | WEIGHTED | | WEIGHTED CA | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AREA (AC) | C(5) | C(100) | AREA (AC) | C(5) | C(100) | C(5) | C(100) | CA(5) | CA(100) |
| B16 | 12.20 | 2.20 | 0.55 | 0.65 | 10.00 | 0.60 | 0.70 | 0.59 | 0.69 | 7.21 | 8.43 |
| B17 | 15.40 | 15.40 | 0.55 | 0.65 | 0.00 | 0.25 | 0.35 | 0.55 | 0.65 | 8.47 | 10.01 |
| B18 | 6.70 | 6.70 | 0.55 | 0.65 | 0.00 | 0.25 | 0.35 | 0.55 | 0.65 | 3.69 | 4.36 |
| B19 | 4.20 | 2.20 | 0.55 | 0.65 | 2.00 | 0.60 | 0.70 | 0.57 | 0.67 | 2.41 | 2.83 |
| B20 | 3.10 | 1.90 | 0.55 | 0.65 | 1.20 | 0.60 | 0.70 | 0.57 | 0.67 | 1.77 | 2.08 |
| B21 | 2.50 | 1.00 | 0.55 | 0.65 | 1.50 | 0.25 | 0.35 | 0.37 | 0.47 | 0.93 | 1.18 |
| B22 | 10.10 | 7.10 | 0.55 | 0.65 | 3.00 | 0.60 | 0.70 | 0.56 | 0.66 | 5.71 | 6.72 |
| | | | | | | | | | | | |
| C1 | 8.10 | 8.10 | 0.55 | 0.65 | 0.00 | 0.25 | 0.35 | 0.55 | 0.65 | 4.46 | 5.27 |
| C2 | 15.70 | 15.70 | 0.55 | 0.65 | 0.00 | 0.25 | 0.35 | 0.55 | 0.65 | 8.64 | 10.21 |
| C3 | 1.90 | 0.90 | 0.55 | 0.65 | 1.00 | 0.25 | 0.35 | 0.39 | 0.49 | 0.75 | 0.94 |
| C4 | 15.00 | 15.00 | 0.60 | 0.70 | 0.00 | 0.25 | 0.35 | 0.60 | 0.70 | 9.00 | 10.50 |
| C5 | 7.80 | 7.80 | 0.55 | 0.65 | 0.00 | 0.25 | 0.35 | 0.55 | 0.65 | 4.29 | 5.07 |
| C6 | 3.30 | 1.30 | 0.55 | 0.65 | 2.00 | 0.60 | 0.70 | 0.58 | 0.68 | 1.92 | 2.25 |
| C7 | 4.30 | 3.30 | 0.55 | 0.65 | 1.00 | 0.25 | 0.35 | 0.48 | 0.58 | 2.07 | 2.50 |
| | | | | | | | | | | | |
| D1 | 7.60 | 7.60 | 0.55 | 0.65 | 0.00 | 0.25 | 0.35 | 0.55 | 0.65 | 4.18 | 4.94 |
| D2 | 6.80 | 4.80 | 0.55 | 0.65 | 2.00 | 0.75 | 0.80 | 0.61 | 0.69 | 4.14 | 4.72 |
| D3 | 13.90 | 9.90 | 0.55 | 0.65 | 4.00 | 0.60 | 0.70 | 0.56 | 0.66 | 7.85 | 9.24 |
| D4 | 6.30 | 6.30 | 0.60 | 0.70 | 0.00 | 0.25 | 0.35 | 0.60 | 0.70 | 3.78 | 4.41 |
| D5 | 4.70 | 3.20 | 0.55 | 0.65 | 1.50 | 0.25 | 0.35 | 0.45 | 0.55 | 2.14 | 2.61 |
| D6 | 11.30 | 11.30 | 0.55 | 0.65 | 0.00 | 0.25 | 0.35 | 0.55 | 0.65 | 6.22 | 7.35 |
| D7 | 1.20 | 0.50 | 0.55 | 0.65 | 0.70 | 0.25 | 0.35 | 0.38 | 0.48 | 0.45 | 0.57 |

JOB NAME: *WATERBURY PDR*
JOB NUMBER: *2359.00*
DATE: *11/28/12*
CALCULATED BY: *MAW*

## PRELIMINARY DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY

| BASIN | TOTAL AREA (AC) | IMPERVIOUS AREA / STREETS | | | LANDSCAPE/UNDEVELOPED AREAS | | | WEIGHTED | | WEIGHTED CA | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AREA (AC) | C(5) | C(100) | AREA (AC) | C(5) | C(100) | C(5) | C(100) | CA(5) | CA(100) |
| E1 | 34.00 | 7.00 | 0.55 | 0.65 | 27.00 | 0.25 | 0.35 | 0.31 | 0.41 | 10.60 | 14.00 |
| OS-1 | 10.90 | 10.90 | 0.35 | 0.45 | 0.00 | 0.25 | 0.35 | 0.35 | 0.45 | 3.82 | 4.91 |
| OS-5 | 2.56 | 2.56 | 0.50 | 0.60 | 0.00 | 0.25 | 0.35 | 0.50 | 0.60 | 1.28 | 1.54 |
| OS-6 | 11.80 | 0.00 | 0.35 | 0.45 | 11.80 | 0.25 | 0.35 | 0.25 | 0.35 | 2.95 | 4.13 |
| OS-7 | 12.50 | 4.00 | 0.35 | 0.45 | 8.50 | 0.25 | 0.35 | 0.28 | 0.38 | 3.53 | 4.78 |
| OS-8 | 6.30 | 6.30 | 0.75 | 0.80 | 0.00 | 0.25 | 0.35 | 0.75 | 0.80 | 4.73 | 5.04 |
| EX-A1 | 44.90 | 0.00 | 0.55 | 0.65 | 44.90 | 0.25 | 0.35 | 0.25 | 0.35 | 11.23 | 15.72 |
| EX-A2 | 4.80 | 0.00 | 0.55 | 0.65 | 4.80 | 0.25 | 0.35 | 0.25 | 0.35 | 1.20 | 1.68 |
| EX-B1 | 97.00 | 0.00 | 0.55 | 0.65 | 97.00 | 0.25 | 0.35 | 0.25 | 0.35 | 24.25 | 33.95 |
| EX-B2 | 6.50 | 0.00 | 0.55 | 0.65 | 6.50 | 0.25 | 0.35 | 0.25 | 0.35 | 1.63 | 2.28 |
| EX-C | 56.30 | 0.00 | 0.50 | 0.60 | 56.30 | 0.25 | 0.35 | 0.25 | 0.35 | 14.08 | 19.71 |
| EX-D | 54.10 | 0.00 | 0.50 | 0.60 | 54.10 | 0.25 | 0.35 | 0.25 | 0.35 | 13.53 | 18.94 |
| EX-E | 55.00 | 0.00 | 0.50 | 0.60 | 55.00 | 0.25 | 0.35 | 0.25 | 0.35 | 13.75 | 19.25 |
| EX-F | 11.90 | 0.00 | 0.50 | 0.60 | 11.90 | 0.25 | 0.35 | 0.25 | 0.35 | 2.98 | 4.17 |

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| JOB NAME: | *WATERBURY PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/28/12* |
| CALC'D BY: | *MAW* |

## PRELIMINARY DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY

| BASIN | WEIGHTED | | OVERLAND | | | | STREET / CHANNEL FLOW | | | | Tc | INTENSITY | | TOTAL FLOWS | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CA(5) | CA(100) | C(5) | Length (ft) | Height (ft) | Tc (min) | Length (ft) | Slope (%) | Velocity (fps) | Tc (min) | TOTAL (min) | I(5) (in/hr) | I(100) (in/hr) | Q(5) (cfs) | Q(100) (cfs) |
| A1 | 4.13 | 5.18 | 0.25 | 200 | 5 | 16.6 | 1500 | 1.5% | 4.3 | 5.8 | 22.4 | 2.84 | 5.05 | 12 | 26 |
| A2 | 1.16 | 1.42 | 0.25 | 50 | 1 | 8.9 | 900 | 1.5% | 4.3 | 3.5 | 12.4 | 3.76 | 6.68 | 4 | 10 |
| A3 | 4.50 | 5.29 | 0.25 | 50 | 1 | 8.9 | 850 | 2.7% | 5.8 | 2.5 | 11.4 | 3.90 | 6.93 | 18 | 37 |
| A4 | 1.21 | 1.43 | 0.25 | 150 | 4 | 14.1 | | | | | 14.1 | 3.56 | 6.33 | 4 | 9 |
| A5 | 3.42 | 3.99 | 0.25 | 50 | 1 | 8.9 | 850 | 2.0% | 4.9 | 2.9 | 11.8 | 3.84 | 6.83 | 13 | 27 |
| A6 | 2.86 | 3.38 | 0.25 | 50 | 1 | 8.9 | 1100 | 2.2% | 5.2 | 3.5 | 12.5 | 3.75 | 6.67 | 11 | 23 |
| A7 | 0.91 | 1.13 | 0.25 | 50 | 2 | 7.1 | 250 | 2.0% | 4.9 | 0.8 | 8.0 | 4.45 | 7.92 | 4 | 9 |
| | | | | | | | | | | | | | | | |
| B1 | 3.08 | 3.64 | 0.25 | 50 | 1 | 8.9 | 1200 | 2.1% | 5.1 | 3.9 | 12.9 | 3.70 | 6.58 | 11 | 24 |
| B2 | 8.80 | 10.40 | 0.25 | 100 | 2 | 12.6 | 1150 | 2.3% | 5.3 | 3.6 | 16.3 | 3.34 | 5.93 | 29 | 62 |
| B3 | 3.75 | 4.65 | 0.25 | 300 | 7 | 20.8 | 400 | 4.0% | 7.0 | 1.0 | 21.8 | 2.89 | 5.13 | 11 | 24 |
| B4 | 0.88 | 1.04 | 0.25 | 100 | 2 | 12.6 | 400 | 2.0% | 4.9 | 1.3 | 14.0 | 3.57 | 6.35 | 3 | 7 |
| B5 | 2.59 | 3.06 | 0.25 | 100 | 2 | 12.6 | 600 | 3.0% | 6.1 | 1.6 | 14.3 | 3.54 | 6.29 | 9 | 19 |
| B6 | 1.32 | 1.54 | 0.25 | 50 | 1 | 8.9 | 500 | 2.5% | 5.5 | 1.5 | 10.4 | 4.03 | 7.17 | 5 | 11 |
| B7 | 5.04 | 5.88 | 0.25 | 100 | 3 | 11.1 | 1100 | 2.5% | 5.5 | 3.3 | 14.4 | 3.53 | 6.27 | 18 | 37 |
| B8 | 4.46 | 5.27 | 0.25 | 100 | 2 | 12.6 | 850 | 2.0% | 4.9 | 2.9 | 15.5 | 3.41 | 6.06 | 15 | 32 |
| B9 | 4.07 | 4.81 | 0.25 | 50 | 1 | 8.9 | 900 | 2.5% | 5.5 | 2.7 | 11.7 | 3.86 | 6.87 | 16 | 33 |
| B10 | 1.85 | 2.10 | 0.25 | 100 | 2 | 12.6 | 500 | 2.0% | 4.9 | 1.7 | 14.3 | 3.53 | 6.28 | 7 | 13 |
| B11 | 2.54 | 3.11 | 0.25 | 50 | 2 | 7.1 | 400 | 2.0% | 4.9 | 1.3 | 8.5 | 4.36 | 7.75 | 11 | 24 |
| B12 | 3.48 | 4.08 | 0.25 | 100 | 2 | 12.6 | 700 | 2.0% | 4.9 | 2.4 | 15.0 | 3.46 | 6.15 | 12 | 25 |
| B13 | 1.98 | 2.34 | 0.25 | 100 | 2 | 12.6 | 350 | 2.0% | 4.9 | 1.2 | 13.8 | 3.59 | 6.38 | 7 | 15 |
| B14 | 3.06 | 3.78 | 0.25 | 50 | 2 | 7.1 | 1300 | 1.5% | 4.3 | 5.1 | 12.2 | 3.79 | 6.74 | 12 | 25 |

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| JOB NAME: | *WATERBURY PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/28/12* |
| CALC'D BY: | *MAW* |

## PRELIMINARY DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY

| BASIN | WEIGHTED | | OVERLAND | | | | STREET / CHANNEL FLOW | | | | Tc | INTENSITY | | TOTAL FLOWS | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CA(5) | CA(100) | C(5) | Length (ft) | Height (ft) | Tc (min) | Length (ft) | Slope (%) | Velocity (fps) | Tc (min) | TOTAL (min) | I(5) (in/hr) | I(100) (in/hr) | Q(5) (cfs) | Q(100) (cfs) |
| B15 | 0.65 | 0.79 | 0.25 | 50 | 2 | 7.1 | 250 | 2.0% | 4.9 | 0.8 | 8.0 | 4.45 | 7.92 | 3 | 6 |
| B16 | 7.21 | 8.43 | 0.25 | 50 | 1 | 8.9 | 1200 | 2.0% | 4.9 | 4.0 | 13.0 | 3.69 | 6.56 | 27 | 55 |
| B17 | 8.47 | 10.01 | 0.25 | 100 | 2 | 12.6 | 1200 | 2.5% | 5.5 | 3.6 | 16.3 | 3.34 | 5.93 | 28 | 59 |
| B18 | 3.69 | 4.36 | 0.25 | 50 | 1 | 8.9 | 1100 | 3.0% | 6.1 | 3.0 | 12.0 | 3.82 | 6.79 | 14 | 30 |
| B19 | 2.41 | 2.83 | 0.25 | 100 | 2 | 12.6 | 350 | 3.0% | 6.1 | 1.0 | 13.6 | 3.62 | 6.43 | 9 | 18 |
| B20 | 1.77 | 2.08 | 0.25 | 100 | 2 | 12.6 | 200 | 1.5% | 4.3 | 0.8 | 13.4 | 3.64 | 6.47 | 6 | 13 |
| B21 | 0.93 | 1.18 | 0.25 | 120 | 10 | 8.6 | | | | | 8.6 | 4.33 | 7.69 | 4 | 9 |
| B22 | 5.71 | 6.72 | 0.25 | 50 | 1 | 8.9 | 1100 | 2.0% | 4.9 | 3.7 | 12.6 | 3.73 | 6.64 | 21 | 45 |
| | | | | | | | | | | | | | | | |
| C1 | 4.46 | 5.27 | 0.25 | 100 | 2 | 12.6 | 1300 | 2.5% | 5.5 | 3.9 | 16.5 | 3.31 | 5.88 | 15 | 31 |
| C2 | 8.64 | 10.21 | 0.25 | 100 | 2 | 12.6 | 1200 | 2.5% | 5.5 | 3.6 | 16.3 | 3.34 | 5.93 | 29 | 61 |
| C3 | 0.75 | 0.94 | 0.25 | 120 | 10 | 8.6 | | | | | 8.6 | 4.33 | 7.69 | 3 | 7 |
| C4 | 9.00 | 10.50 | 0.25 | 100 | 2 | 12.6 | 1200 | 1.8% | 4.7 | 4.3 | 16.9 | 3.27 | 5.82 | 29 | 61 |
| C5 | 4.29 | 5.07 | 0.25 | 50 | 1 | 8.9 | 850 | 2.0% | 4.9 | 2.9 | 11.8 | 3.84 | 6.83 | 16 | 35 |
| C6 | 1.92 | 2.25 | 0.25 | 100 | 2 | 12.6 | 150 | 3.0% | 6.1 | 0.4 | 13.1 | 3.68 | 6.55 | 7 | 15 |
| C7 | 2.07 | 2.50 | 0.25 | 50 | 2 | 7.1 | | | | | 7.1 | 4.62 | 8.21 | 10 | 20 |
| | | | | | | | | | | | | | | | |
| D1 | 4.18 | 4.94 | 0.25 | 100 | 2 | 12.6 | 800 | 2.0% | 4.9 | 2.7 | 15.3 | 3.43 | 6.09 | 14 | 30 |
| D2 | 4.14 | 4.72 | 0.25 | 50 | 1 | 8.9 | 900 | 2.5% | 5.5 | 2.7 | 11.7 | 3.86 | 6.87 | 16 | 32 |
| D3 | 7.85 | 9.24 | 0.25 | 100 | 2 | 12.6 | 1600 | 1.8% | 4.7 | 5.7 | 18.3 | 3.15 | 5.60 | 25 | 52 |

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| JOB NAME: | *WATERBURY PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/28/12* |
| CALC'D BY: | *MAW* |

## PRELIMINARY DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY

| BASIN | WEIGHTED CA(5) | WEIGHTED CA(100) | OVERLAND C(5) | OVERLAND Length (ft) | OVERLAND Height (ft) | OVERLAND Tc (min) | STREET / CHANNEL FLOW Length (ft) | STREET / CHANNEL FLOW Slope (%) | STREET / CHANNEL FLOW Velocity (fps) | STREET / CHANNEL FLOW Tc (min) | Tc TOTAL (min) | INTENSITY I(5) (in/hr) | INTENSITY I(100) (in/hr) | TOTAL FLOWS Q(5) (cfs) | TOTAL FLOWS Q(100) (cfs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D4 | 3.78 | 4.41 | 0.25 | 100 | 2 | 12.6 | 1200 | 2.0% | 4.9 | 4.0 | 16.7 | 3.29 | 5.86 | 12 | 26 |
| D5 | 2.14 | 2.61 | 0.25 | 50 | 2 | 7.1 | | | | | 7.1 | 4.62 | 8.21 | 10 | 21 |
| D6 | 6.22 | 7.35 | 0.25 | 100 | 2 | 12.6 | 1100 | 2.0% | 4.9 | 3.7 | 16.3 | 3.33 | 5.91 | 21 | 43 |
| D7 | 0.45 | 0.57 | 0.25 | 100 | 2 | 12.6 | 1100 | 2.0% | 4.9 | 3.7 | 16.3 | 3.33 | 5.91 | 1 | 3 |
| | | | | | | | | | | | | | | | |
| E1 | 10.60 | 14.00 | 0.25 | 150 | 2 | 17.7 | 2300 | 1.0% | 3.5 | 11.0 | 28.7 | 2.49 | 4.42 | 26 | 62 |
| | | | | | | | | | | | | | | | |
| OS-1 | 3.82 | 4.91 | 0.25 | 300 | 10 | 18.5 | | | | | 18.5 | 3.13 | 5.57 | 12 | 27 |
| OS-5 | 1.28 | 1.54 | 0.25 | 200 | 16 | 11.3 | | | | | 11.3 | 3.91 | 6.95 | 5 | 11 |
| OS-6 | 2.95 | 4.13 | 0.25 | 600 | 18 | 27.1 | | | | | 27.1 | 2.57 | 4.56 | 8 | 19 |
| OS-7 | 3.53 | 4.78 | 0.25 | 800 | 30 | 29.1 | | | | | 29.1 | 2.47 | 4.38 | 9 | 21 |
| OS-8 | 4.73 | 5.04 | 0.25 | 25 | 0.5 | 6.3 | 800 | 2.0% | 4.9 | 2.7 | 9.0 | 4.26 | 7.56 | 20 | 38 |
| | | | | | | | | | | | | | | | |
| EX-A1 | 11.23 | 15.72 | 0.25 | 1000 | 20 | 40.0 | | | | | 40.0 | 2.04 | 3.64 | 23 | 57 |
| EX-A2 | 1.20 | 1.68 | 0.25 | 350 | 8 | 22.6 | | | | | 22.6 | 2.83 | 5.03 | 3 | 8 |
| EX-B1 | 24.25 | 33.95 | 0.25 | 1000 | 30 | 35.0 | 1500 | 1.8% | 4.7 | 5.3 | 40.3 | 2.04 | 3.62 | 49 | 123 |
| EX-B2 | 1.63 | 2.28 | 0.25 | 300 | 8 | 19.9 | | | | | 19.9 | 3.02 | 5.37 | 5 | 12 |
| EX-C | 14.08 | 19.71 | 0.25 | 1000 | 24 | 37.7 | | | | | 37.7 | 2.12 | 3.77 | 30 | 74 |
| EX-D | 13.53 | 18.94 | 0.25 | 1000 | 26 | 36.7 | | | | | 36.7 | 2.15 | 3.83 | 29 | 73 |
| EX-E | 13.75 | 19.25 | 0.25 | 1000 | 24 | 37.7 | 1800 | 1.6% | 4.7 | 6.4 | 44.0 | 1.93 | 3.43 | 26 | 66 |
| EX-F | 2.98 | 4.17 | 0.25 | 800 | 16 | 35.8 | | | | | 35.8 | 2.19 | 3.89 | 7 | 16 |

JOB NAME: *WATERBURY PDR*
JOB NUMBER: *2359.00*
DATE: *11/28/12*
CALCULATED BY: *MAW*

## PRELIMINARY DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY

| Design Point(s) | Contributing Basins | Equivalent CA(5) | Equivalent CA(100) | Maximum Tc | Intensity | | Flow | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | I(5) | I(100) | Q(5) | Q(100) | Facility Size |
| EX1 | OS-5, OS-6, EX-A2, EX-B1, EX B2 | 31.31 | 43.57 | 40.3 | 2.04 | 3.62 | 64 | 158 | Natural Channel |
| 1 | Pond WF-S1 Release, OS-1, OS-5, A-1 | 20.92 | 42.92 | 36.0 | 2.18 | 3.87 | 46 | 166 | Dual 42" RCP Culverts |
| 2 | A3 | 4.50 | 5.29 | 11.4 | 3.90 | 6.93 | 18 | 37 | 8' Type R Sump Inlets |
| 3 | A5 | 3.42 | 3.99 | 11.8 | 3.84 | 6.83 | 13 | 27 | 6' Type R Sump Inlets |
| 4 | A6 | 2.86 | 3.38 | 12.5 | 3.75 | 6.67 | 11 | 23 | 10' Type R Sump Inlet |
| **5 (Pond 1 In-Flow)** | **A3, A5, A6, A7** | **11.69** | **13.79** | **17.4** | **3.23** | **5.74** | **38** | **79** | **2.66 Ac.-Ft. Pond** |
| 6 | B1 | 3.08 | 3.64 | 12.9 | 3.70 | 6.58 | 11 | 24 | 4' Type R Sump Inlets |
| 7 | B2 | 8.80 | 10.40 | 16.3 | 3.34 | 5.93 | 29 | 62 | 16' Type R Sump Inlets |
| 8 | B4 | 0.88 | 1.04 | 14.0 | 3.57 | 6.35 | 3 | 7 | 4' Type R Sump Inlet |
| 9 | B5 | 2.59 | 3.06 | 14.3 | 3.54 | 6.29 | 9 | 19 | 4' Type R Sump Inlets |
| 10 | B6 | 1.32 | 1.54 | 10.4 | 4.03 | 7.17 | 5 | 11 | 4' Type R Sump Inlet |
| 11 | B7 | 5.04 | 5.88 | 14.4 | 3.53 | 6.27 | 18 | 37 | 8' Type R Sump Inlets |
| 12 | B8 | 4.46 | 5.27 | 15.5 | 3.41 | 6.06 | 15 | 32 | 6' Type R Sump Inlets |
| **13 (Pond 2A In-Flow)** | **B1, B2, B3, B4, B5, B6, B7, B8 and OS-6** | **32.86** | **39.60** | **31.1** | **2.37** | **4.22** | **78** | **167** | **5.11 Ac.-Ft. Pond** |
| 14 | B9 | 4.07 | 4.81 | 11.7 | 3.86 | 6.87 | 16 | 33 | 16' Type R Sump Inlet |

JOB NAME: *WATERBURY PDR*
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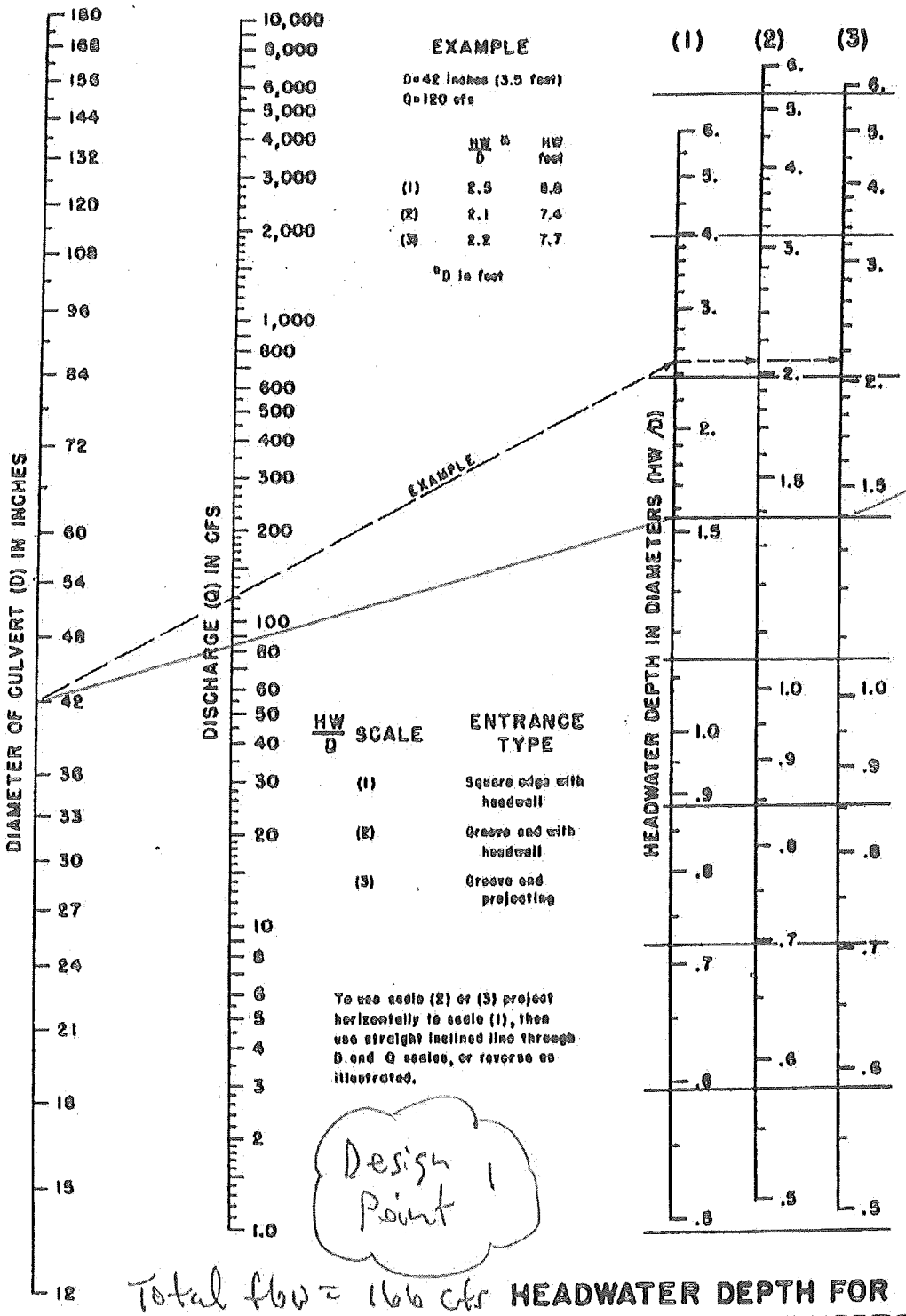
## PRELIMINARY DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY

| Design Point(s) | Contributing Basins | Equivalent CA(5) | Equivalent CA(100) | Maximum Tc | Intensity | | Flow | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | I(5) | I(100) | Q(5) | Q(100) | Facility Size |
| 15 | B10 | 1.85 | 2.10 | 14.3 | 3.53 | 6.28 | 7 | 13 | 4' Type R Sump Inlets |
| **16 (Pond 2B In-Flow)** | **Pond 2A Release, B9, B10, B11** | **28.96** | **31.02** | **46.0** | 1.88 | 3.33 | **54** | **103** | **3.68 Ac.-Ft. Pond** |
| 17 | B12 | 3.48 | 4.08 | 15.0 | 3.46 | 6.15 | 12 | 25 | 4' Type R Sump Inlets |
| 18 | B13 | 1.98 | 2.34 | 13.8 | 3.59 | 6.38 | 7 | 15 | 4' Type R Sump Inlets |
| 19 | B16 | 7.21 | 8.43 | 13.0 | 3.69 | 6.56 | 27 | 55 | 14' Type R Sump Inlets |
| 20 | B17 | 8.47 | 10.01 | 16.3 | 3.34 | 5.93 | 28 | 59 | 14' Type R Sump Inlets |
| 21 | B18 | 3.69 | 4.36 | 12.0 | 3.82 | 6.79 | 14 | 30 | 6' Type R Sump Inlets |
| 22 | B19 | 2.41 | 2.83 | 13.6 | 3.62 | 6.43 | 9 | 18 | 4' Type R Sump Inlets |
| 23 | B20 | 1.77 | 2.08 | 13.4 | 3.64 | 6.47 | 6 | 13 | 4' Type R Sump Inlets |
| 24 | B21 | 0.93 | 1.18 | 8.6 | 4.33 | 7.69 | 4 | 9 | 4' Type R Sump Inlets |
| 25 | B22 | 5.71 | 6.72 | 12.6 | 3.73 | 6.64 | 21 | 45 | 10' Type R Sump Inlets |
| **26 (Pond 2C In-Flow)** | **Pond 2B Release, B12, B13, B14, B16 - B22, OS-8** | **86.62** | **96.53** | **60.0** | 1.58 | 2.81 | **137** | **272** | **6.82 Ac.-Ft. Pond** |
| 27 | C1 | 4.46 | 5.27 | 16.6 | 3.31 | 5.88 | 15 | 31 | 6' Type R Sump Inlets |

JOB NAME: *WATERBURY PDR*
JOB NUMBER: *2359.00*
DATE: *11/28/12*
CALCULATED BY: *MAW*

## PRELIMINARY DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY

| Design Point(s) | Contributing Basins | Equivalent CA(5) | Equivalent CA(100) | Maximum Tc | Intensity | | Flow | | Facility Size |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | I(5) | I(100) | Q(5) | Q(100) | |
| 28 | C2 | 8.64 | 10.21 | 16.3 | 3.34 | 5.93 | 29 | 61 | 16' Type R Sump Inlets |
| **29 (Pond 3C In-Flow)** | **C1, C2, C3** | **13.84** | **16.41** | **20.1** | **3.01** | **5.35** | **42** | **88** | **1.95 Ac.-Ft. Pond** |
| 30 | Pond 3C Release in SWQ Swale | 7.80 | 11.95 | 30.5 | 2.40 | 4.27 | 19 | 51 | |
| 31 | C4 | 9.00 | 10.50 | 16.9 | 3.27 | 5.82 | 29 | 61 | 16' Type R Sump Inlets |
| 32 | C5 | 4.29 | 5.07 | 11.8 | 3.84 | 6.83 | 16 | 35 | 6' Type R Sump Inlets |
| **33 (Pond 3B In-Flow)** | **C4, C5** | **13.29** | **15.57** | **18.9** | **3.10** | **5.51** | **41** | **86** | **1.39 Ac.-Ft. Pond** |
| 34 | C6 | 1.92 | 2.25 | 13.1 | 3.68 | 6.55 | 7 | 15 | 4' Type R Sump Inlets |
| 35 | Basin C6 and Pond 3B Release into SWQ Swale | 8.51 | 13.16 | 31.0 | 2.38 | 4.23 | 20 | 56 | |
| 36 | D1 | 4.18 | 4.94 | 15.3 | 3.43 | 6.09 | 14 | 30 | 6' Type R Sump Inlets |
| 37 | D2 | 4.14 | 4.72 | 11.7 | 3.86 | 6.87 | 16 | 32 | 6' Type R Sump Inlets |
| 38 | D3 | 7.85 | 9.24 | 18.3 | 3.15 | 5.60 | 25 | 52 | 12' Type R Sump Inlets |
| 39 | D4 | 3.78 | 4.41 | 16.7 | 3.29 | 5.86 | 12 | 26 | 4' Type R Sump Inlets |
| **40 (Pond 3A In-Flow)** | **D2, D3, D4, D7** | **16.22** | **18.94** | **22.3** | **2.85** | **5.06** | **46** | **96** | **4.10. AC-FT** |
| 41 | D6 | 6.22 | 7.35 | 16.3 | 3.33 | 5.91 | 21 | 43 | 10' Type R Sump Inlets |
| 42 | Basins D1, D6 and Pond 3A Release into exist. channel | 11.40 | 19.29 | 45.0 | 1.90 | 3.38 | 22 | 65 | Natural Channel |




1.4 = HW/D

HW = 4.9'

prop. HW = 5.9'

prop. dual 42" RCPs

# HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** **2**

***Total Flow:*** $Q_5$ = **9** cfs

$Q_{100}$ = **19** cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$

W = 2 ft.
a = 3 in.

Clogging Factor = 1.25
Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** [ 8 ] foot inlet required

***100-Year Event:*** [ 6 ] foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** 3

***Total Flow:*** $Q_5$ = 7 cfs

$Q_{100}$ = 14 cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** 6 foot inlet required

***100-Year Event:*** 4 foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** 4

***Total Flow:***

$Q_5$ = 11 cfs

$Q_{100}$ = 23 cfs

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** **10** foot inlet required

***100-Year Event:*** **8** foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** 6

***Total Flow:*** $Q_5$ = 6 cfs

$Q_{100}$ = 12 cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** 4 foot inlet required

***100-Year Event:*** 4 foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** 7

***Total Flow:*** $Q_5$ = 15 cfs

$Q_{100}$ = 31 cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** 16 foot inlet required

***100-Year Event:*** 12 foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** 8

***Total Flow:***

$Q_5$ = 3 cfs

$Q_{100}$ = 7 cfs

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** 4 foot inlet required

***100-Year Event:*** 4 foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** **9**

***Total Flow:*** $Q_5$ = **5** cfs

$Q_{100}$ = **10** cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** | 4 | foot inlet required

***100-Year Event:*** | 4 | foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** 10

***Total Flow:***

$Q_5$ = 5 cfs

$Q_{100}$ = 11 cfs

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** 4 foot inlet required

***100-Year Event:*** 4 foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** 11

***Total Flow:*** $Q_5$ = 9 cfs

$Q_{100}$ = 19 cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** 8 foot inlet required

***100-Year Event:*** 6 foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** 12

***Total Flow:*** $Q_5$ = 8 cfs

$Q_{100}$ = 16 cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** 6 foot inlet required

***100-Year Event:*** 4 foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** **14**

***Total Flow:***

$Q_5$ = **16** cfs

$Q_{100}$ = **33** cfs

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** **16** foot inlet required

***100-Year Event:*** **12** foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** 15

***Total Flow:*** $Q_5$ = 4 cfs

$Q_{100}$ = 7 cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** 4 foot inlet required

***100-Year Event:*** 4 foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** 17

***Total Flow:*** $Q_5$ = 6 cfs

$Q_{100}$ = 13 cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** 4 foot inlet required

***100-Year Event:*** 4 foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** 18

***Total Flow:*** $Q_5$ = 4 cfs

$Q_{100}$ = 8 cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** 4 foot inlet required

***100-Year Event:*** 4 foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** **19**

***Total Flow:*** $Q_5$ = **14** cfs

$Q_{100}$ = **28** cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$$

W = 2 ft.
a = 3 in.

Clogging Factor = 1.25
Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** **14** foot inlet required

***100-Year Event:*** **10** foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** **20**

***Total Flow:*** $Q_5$ = **14** cfs

$Q_{100}$ = **30** cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$

W = 2 ft.
a = 3 in.

Clogging Factor = 1.25
Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** **14** foot inlet required

***100-Year Event:*** **12** foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** 21

***Total Flow:*** $Q_5$ = 7 cfs

$Q_{100}$ = **15** cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$$

W = 2 ft.
a = 3 in.

Clogging Factor = 1.25
Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** | 6 | foot inlet required

***100-Year Event:*** | 4 | foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
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| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** 22

***Total Flow:*** $Q_5$ = 5 cfs

$Q_{100}$ = 9 cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** 4 foot inlet required

***100-Year Event:*** 4 foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** **23**

***Total Flow:*** $Q_5$ = 3 cfs

$Q_{100}$ = 7 cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** 4 foot inlet required

***100-Year Event:*** 4 foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** 24

***Total Flow:*** $Q_5$ = 2 cfs

$Q_{100}$ = 5 cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** 4 foot inlet required

***100-Year Event:*** 4 foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** **25**

***Total Flow:*** $Q_5$ = **11** cfs

$Q_{100}$ = **23** cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** **10** foot inlet required

***100-Year Event:*** **8** foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** 27

***Total Flow:*** $Q_5$ = 8 cfs

$Q_{100}$ = 16 cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** 6 foot inlet required

***100-Year Event:*** 4 foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** **28**

***Total Flow:*** $Q_5$ = **15** cfs

$Q_{100}$ = **31** cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** **16** foot inlet required

***100-Year Event:*** **12** foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** 31

***Total Flow:*** $Q_5$ = 15 cfs

$Q_{100}$ = 31 cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** 16 foot inlet required

***100-Year Event:*** 12 foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** **32**

***Total Flow:*** $Q_5$ = **8** cfs

$Q_{100}$ = **18** cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** **6** foot inlet required

***100-Year Event:*** **6** foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** 34

***Total Flow:*** $Q_5$ = 4 cfs

$Q_{100}$ = 8 cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$$

W = 2 ft.
a = 3 in.

Clogging Factor = 1.25
Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** [ 4 ] foot inlet required

***100-Year Event:*** [ 4 ] foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** 36

***Total Flow:*** $Q_5$ = 7 cfs

$Q_{100}$ = 15 cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** 6 foot inlet required

***100-Year Event:*** 4 foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** 37

***Total Flow:*** $Q_5$ = 8 cfs

$Q_{100}$ = 16 cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** 6 foot inlet required

***100-Year Event:*** 4 foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** **38**

***Total Flow:*** $Q_5$ = **13** cfs

$Q_{100}$ = **26** cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$

W = 2 ft.
a = 3 in.

Clogging Factor = 1.25
Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** **12** foot inlet required

***100-Year Event:*** **10** foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** 39

***Total Flow:*** $Q_5$ = 6 cfs

$Q_{100}$ = 13 cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$$

W = 2 ft.
a = 3 in.

Clogging Factor = 1.25
Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** 4 foot inlet required

***100-Year Event:*** 4 foot inlet required

| | |
|---|---|
| JOB NAME: | *WATERBURY - PDR* |
| JOB NUMBER: | *2359.00* |
| DATE: | *11/12/12* |
| CALCULATED BY: | *MAW* |

**DESIGN POINT** 41

***Total Flow:*** $Q_5$ = 11 cfs

$Q_{100}$ = 22 cfs

***(Assume even split of flows at lowpoint for prelim. inlet sizing)***

***Max. allowable ponding depth:***
***(Residential street, ramp curb)***

$D_5$ = 0.50 ft.

$D_{100}$ = 1.00 ft.

***Std. Type R curb inlet detail:***

$$Qi = 1.7(Li+1.8(W))(dmax + a)^{1.85}$$

W = 2 ft.

a = 3 in.

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

***Curb inlet sizing:***

***5-Year Event:*** 10 foot inlet required

***100-Year Event:*** 8 foot inlet required

## Design Procedure Form: Extended Detention Basin (EDB)



Designer: Marc A. Whorton
Company: Classic Consulting Engineers and Surveyors
Date: November 13, 2012
Project: Waterbury - PDR
Location: Pond 1

1. Basin Storage Volume

A) Effective Imperviousness of Tributary Area, $I_a$ — $I_a$ = 53.0 %

B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$) — i = 0.530

C) Contributing Watershed Area — Area = 21.000 ac

D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm — $d_6$ = 0.42 in

E) Design Concept (Select EURV when also designing for flood control!)

Choose One
- ○ Water Quality Capture Volume (WQCV)
- ◉ Excess Urban Runoff Volume (EURV)

F) Design Volume (1.2 WQCV) Based on 40-hour Drain Time
($V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area * 1.2)$) — $V_{DESIGN}$ = 0.451 ac-ft

G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume
($V_{WQCV\ OTHER} = (d_6 * (V_{DESIGN} / 0.43))$) — $V_{DESIGN\ OTHER}$ = 0.440 ac-ft

H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired) — $V_{DESIGN\ USER}$ = ____ ac-ft

I) Predominant Watershed NRCS Soil Group

Choose One
- ◉ A
- ○ B
- ○ C / D

J) Excess Urban Runoff Volume (EURV) Design Volume
For HSG A: $EURV_A = (0.1678i - 0.0104) * Area$
For HSG B: $EURV_B = (0.1176i - 0.0042) * Area$
For HSG C/D: $EURV_{C/D} = (0.1043i - 0.0031) * Area$

EURV = 1.672 ac-ft

2. Basin Shape: Length to Width Ratio
(A basin length to width ratio of at least 2:1 will improve TSS reduction.) — L : W = 2.0 : 1

3. Basin Side Slopes

A) Basin Maximum Side Slopes
(Horizontal distance per unit vertical, 4:1 or flatter preferred) — Z = 4.00 ft / ft

4. Inlet

A) Describe means of providing energy dissipation at concentrated inflow locations:

## Design Procedure Form: Extended Detention Basin (EDB)



| | |
|---|---|
| Designer: | Marc A. Whorton |
| Company: | Classic Consulting Engineers and Surveyors |
| Date: | November 13, 2012 |
| Project: | Waterbury - PDR |
| Location: | Pond 2A |

1. Basin Storage Volume

A) Effective Imperviousness of Tributary Area, $I_a$

$I_a$ = 53.0 %

B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$ )

$i$ = 0.530

C) Contributing Watershed Area

Area = 55.600 ac

D) For Watersheds Outsida of the Denver Region, Depth of Average Runoff Producing Storm

$d_6$ = 0.42 in

E) Design Concept
(Select EURV when also designing for flood control)

Choose One
- ○ Water Quality Capture Volume (WQCV)
- ◉ Excess Urban Runoff Volume (EURV)

F) Design Volume (1.2 WQCV) Based on 40-hour Drain Time
($V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area * 1.2$)

$V_{DESIGN}$= 1.193 ac-ft

G) For Watersheds Outside of the Denver Region,
Water Quality Capture Volume (WQCV) Design Volume
($V_{WQCV\ OTHER} = (d_6 * (V_{DESIGN} / 0.43)$)

$V_{DESIGN\ OTHER}$= 1.165 ac-ft

H) User Input of Water Quality Capture Volume (WQCV) Design Volume
(Only if e different WQCV Design Volume is desired)

$V_{DESIGN\ USER}$= ac-ft

I) Predominant Watershed NRCS Soil Group

Choose One
- ○ A
- ◉ B
- ○ C / D

J) Excess Urban Runoff Volume (EURV) Design Volume
For HSG A: $EURV_A = (0.1678i - 0.0104) * Area$
For HSG B: $EURV_B = (0.1178i - 0.0042) * Area$
For HSG C/D: $EURV_{C/D} = (0.1043i - 0.0031) * Area$

EURV = 3.238 ac-ft

2. Basin Shape: Length to Width Ratio
(A basin length to width ratio of at least 2:1 will improve TSS reduction.)

L : W = 2.0 : 1

3. Basin Side Slopes

A) Basin Maximum Side Slopes
(Horizontal distance per unit vertical, 4:1 or flatter preferred)

Z = 4.00 ft / ft

4. Inlet

A) Describe means of providing energy dissipation at concentrated inflow locations:

## Design Procedure Form: Extended Detention Basin (EDB)



| | |
|---|---|
| Designer: | Marc A. Whorton |
| Company: | Classic Consulting Engineers and Surveyors |
| Date: | November 13, 2012 |
| Project: | Waterbury - PDR |
| Location: | Pond 2B |

| | |
|---|---|
| 1. Basin Storage Volume | |
| A) Effective Imperviousness of Tributary Area, $I_a$ | $I_a$ = 53.0 % |
| B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$) | i = 0.530 |
| C) Contributing Watershed Area | Area = 16.100 ac |
| D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm | $d_6$ = 0.42 in |
| E) Design Concept (Select EURV when also designing for flood control) | Choose One: ○ Water Quality Capture Volume (WQCV) ◉ Excess Urban Runoff Volume (EURV) |
| F) Design Volume (1.2 WQCV) Based on 40-hour Drain Time ($V_{DESIGN} = \{1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area * 1.2\}$) | $V_{DESIGN}$= 0.346 ac-ft |
| G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume ($V_{WQCV\ OTHER} = (d_6 * (V_{DESIGN}/0.43))$) | $V_{DESIGN\ OTHER}$= 0.337 ac-ft |
| H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired) | $V_{DESIGN\ USER}$= ac-ft |
| I) Predominant Watershed NRCS Soil Group | Choose One: ○ A ◉ B ○ C / D |
| J) Excess Urban Runoff Volume (EURV) Design Volume<br>For HSG A: $EURV_A = (0.1878i - 0.0104) * Area$<br>For HSG B: $EURV_B = (0.1178i - 0.0042) * Area$<br>For HSG C/D: $EURV_{C/D} = (0.1043i - 0.0031) * Area$ | EURV = 0.938 ac-ft |
| 2. Basin Shape: Length to Width Ratio (A basin length to width ratio of at least 2:1 will improve TSS reduction.) | L : W = 2.0 : 1 |
| 3. Basin Side Slopes | |
| A) Basin Maximum Side Slopes (Horizontal distance per unit vertical, 4:1 or flatter preferred) | Z = 4.00 ft / ft |
| 4. Inlet | |
| A) Describe means of providing energy dissipation at concentrated inflow locations: | |

## Design Procedure Form: Extended Detention Basin (EDB)



| | |
|---|---|
| Designer: | Marc A. Whorton |
| Company: | Classic Consulting Engineers and Surveyors |
| Date: | November 13, 2012 |
| Project: | Waterbury - PDR |
| Location: | Pond 2C |

1. Basin Storage Volume

A) Effective Imperviousness of Tributary Area, $I_a$ — $I_a$ = 53.0 %

B) Tributary Area's Imperviousness Ratio (i = $I_a$ / 100 ) — i = 0.530

C) Contributing Watershed Area — Area = 77.300 ac

D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm — $d_0$ = 0.42 in

E) Design Concept (Select EURV when also designing for flood control)

Choose One
- ○ Water Quality Capture Volume (WQCV)
- ◉ Excess Urban Runoff Volume (EURV)

F) Design Volume (1.2 WQCV) Based on 40-hour Drain Time
($V_{DESIGN}$ = (1.0 * (0.91 * i³ - 1.19 * i² + 0.78 * i) / 12 * Area * 1.2) — $V_{DESIGN}$ = 1.659 ac-ft

G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume
($V_{WQCV\ OTHER}$ = ($d_0$*($V_{DESIGN}$/0.43)) — $V_{DESIGN\ OTHER}$ = 1.620 ac-ft

H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired) — $V_{DESIGN\ USER}$ = _____ ac-ft

I) Predominant Watershed NRCS Soil Group

Choose One
- ○ A
- ◉ B
- ○ C / D

J) Excess Urban Runoff Volume (EURV) Design Volume
For HSG A: $EURV_A$ = (0.1878i - 0.0104)*Area
For HSG B: $EURV_B$ = (0.1178i - 0.0042)*Aree
For HSG C/D: $EURV_{C/D}$ = (0.1043i - 0.0031)*Area

EURV = 4.601 ac-ft

2. Basin Shape: Length to Width Ratio
(A basin length to width ratio of at least 2:1 will improve TSS reduction.) — L : W = 2.0 : 1

3. Basin Side Slopes

A) Basin Maximum Side Slopes
(Horizontal distance per unit vertical, 4:1 or flatter preferred) — Z = 4.00 ft / ft

4. Inlet

A) Describe means of providing energy dissipation at concentrated inflow locations:

## Design Procedure Form: Extended Detention Basin (EDB)



| | |
|---|---|
| Designer: | Marc A. Whorton |
| Company: | Classic Consulting Engineers and Surveyors |
| Date: | November 14, 2012 |
| Project: | Waterbury - PDR |
| Location: | Pond 3A |

**1. Basin Storage Volume**

A) Effective Imperviousness of Tributary Area, $I_a$ — $I_a$ = 53.0 %

B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$) — i = 0.530

C) Contributing Watershed Area — Area = 28.200 ac

D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm — $d_6$ = 0.42 in

E) Design Concept (Select EURV when also designing for flood control)

Choose One
- ○ Water Quality Capture Volume (WQCV)
- ◉ Excess Urban Runoff Volume (EURV)

F) Design Volume (1.2 WQCV) Based on 40-hour Drain Time
($V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area * 1.2)$) — $V_{DESIGN}$ = 0.605 ac-ft

G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume
($V_{WQCV\ OTHER} = (d_6 * (V_{DESIGN}/0.43))$) — $V_{DESIGN\ OTHER}$ = 0.591 ac-ft

H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired) — $V_{DESIGN\ USER}$ = ac-ft

I) Predominant Watershed NRCS Soil Group

Choose One
- ◉ A
- ○ B
- ○ C / D

J) Excess Urban Runoff Volume (EURV) Design Volume
For HSG A: $EURV_A = (0.1878i - 0.0104) * Area$
For HSG B: $EURV_B = (0.1178i - 0.0042) * Area$
For HSG C/D: $EURV_{C/D} = (0.1043i - 0.0031) * Area$

EURV = 2.514 ac-ft

**2. Basin Shape: Length to Width Ratio**
(A basin length to width ratio of at least 2:1 will improve TSS reduction.)

L : W = 2.0 : 1

**3. Basin Side Slopes**

A) Basin Maximum Side Slopes
(Horizontal distance per unit vertical, 4:1 or flatter preferred)

Z = 4.00 ft / ft

**4. Inlet**

A) Describe means of providing energy dissipation at concentrated inflow locations:

## Design Procedure Form: Extended Detention Basin (EDB)



Designer: Marc A. Whorton
Company: Classic Consulting Engineers and Surveyors
Date: November 14, 2012
Project: Waterbury - PDR
Location: Pond 3B

1. Basin Storage Volume

A) Effective Imperviousness of Tributary Area, $I_a$ — $I_a$ = 53.0 %

B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$) — i = 0.530

C) Contributing Watershed Area — Area = 22.800 ac

D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm — $d_0$ = 0.42 in

E) Design Concept (Select EURV when also designing for flood control!)

Choose One
- ○ Water Quality Capture Volume (WQCV)
- ◉ Excess Urban Runoff Volume (EURV)

F) Design Volume (1.2 WQCV) Based on 40-hour Drain Time
($V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area * 1.2$) — $V_{DESIGN}$ = 0.489 ac-ft

G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume
($V_{WQCV\ OTHER} = (d_0 * (V_{DESIGN} / 0.43))$) — $V_{DESIGN\ OTHER}$ = 0.478 ac-ft

H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired) — $V_{DESIGN\ USER}$ = _____ ac-ft

I) Predominant Watershed NRCS Soil Group

Choose One
- ○ A
- ◉ B
- ○ C / D

J) Excess Urban Runoff Volume (EURV) Design Volume
For HSG A: $EURV_A = (0.1878i - 0.0104) * Area$
For HSG B: $EURV_B = (0.1178i - 0.0042) * Area$
For HSG C/D: $EURV_{C/D} = (0.1043i - 0.0031) * Area$

EURV = 1.328 ac-ft

2. Basin Shape: Length to Width Ratio
(A basin length to width ratio of at least 2:1 will improve TSS reduction.) — L : W = 2.0 : 1

3. Basin Side Slopes

A) Basin Maximum Side Slopes
(Horizontal distance per unit vertical, 4:1 or flatter preferred) — Z = 4.00 ft / ft

4. Inlet

A) Describe means of providing energy dissipation at concentrated inflow locations:

## Design Procedure Form: Extended Detention Basin (EDB)



| | |
|---|---|
| Designer: | Marc A. Whorton |
| Company: | Classic Consulting Engineers and Surveyors |
| Date: | November 14, 2012 |
| Project: | Waterbury - PDR |
| Location: | Pond 3C |

1. Basin Storage Volume

A) Effective Imperviousness of Tributary Area, $I_a$ — $I_a$ = 53.0 %

B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$) — i = 0.530

C) Contributing Watershed Area — Area = 25.700 ac

D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm — $d_0$ = 0.42 in

E) Design Concept (Select EURV when also designing for flood control)

Choose One
- ○ Water Quality Capture Volume (WQCV)
- ◉ Excess Urban Runoff Volume (EURV)

F) Design Volume (1.2 WQCV) Based on 40-hour Drain Time
($V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area * 1.2)$) — $V_{DESIGN}$= 0.552 ac-ft

G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume
($V_{WQCV\ OTHER} = (d_0 * (V_{DESIGN}/0.43))$) — $V_{DESIGN\ OTHER}$= 0.539 ac-ft

H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired) — $V_{DESIGN\ USER}$= ac-ft

I) Predominant Watershed NRCS Soil Group

Choose One
- ○ A
- ◉ B
- ○ C / D

J) Excess Urban Runoff Volume (EURV) Design Volume
For HSG A: EURVA = (0.1878i - 0.0104)*Area
For HSG B: $EURV_B$ = (0.1178i - 0.0042)*Area
For HSG C/D: $EURV_{C/D}$ = (0.1043i - 0.0031)*Area

EURV = 1.497 ac-ft

2. Basin Shape: Length to Width Ratio
(A basin length to width ratio of at least 2:1 will improve TSS reduction.) — L : W = 2.0 : 1

3. Basin Side Slopes

A) Basin Maximum Side Slopes
(Horizontal distance per unit vertical, 4:1 or flatter preferred) — Z = 4.00 ft / ft

4. Inlet

A) Describe means of providing energy dissipation at concentrated inflow locations:

## Design Procedure Form: Extended Detention Basin (EDB)



| | |
|---|---|
| Designer: | Marc A. Whorton |
| Company: | Classic Consulting Engineers and Surveyors |
| Date: | November 14, 2012 |
| Project: | Waterbury - PDR |
| Location: | SWQ Facility for Basin D1 |

**1. Basin Storage Volume**

A) Effective Imperviousness of Tributary Area, $I_a$ — $I_a$ = 53.0 %

B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$) — i = 0.530

C) Contributing Watershed Area — Area = 7.600 ac

D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm — $d_6$ = 0.42 in

E) Design Concept (Select EURV when also designing for flood control)

Choose One
- (●) Water Quality Captura Volume (WQCV)
- ( ) Excess Urban Runoff Volume (EURV)

F) Design Volume (1.2 WQCV) Based on 40-hour Drain Time
($V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area * 1.2)$) — $V_{DESIGN}$ = 0.163 ac-ft

G) For Watersheds Outside of the Denver Region, Water Quality Captura Volume (WQCV) Design Volume
($V_{WQCV\,OTHER} = (d_6 * (V_{DESIGN} / 0.43))$) — $V_{DESIGN\,OTHER}$ = 0.159 ac-ft

H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired) — $V_{DESIGN\,USER}$ = _____ ac-ft

I) Predominant Watershed NRCS Soil Group

Choose One
- ( ) A
- (●) B
- ( ) C / D

J) Excess Urban Runoff Volume (EURV) Design Volume
For HSG A: $EURV_A = (0.1878i - 0.0104) * Area$
For HSG B: $EURV_B = (0.1178i - 0.0042) * Area$
For HSG C/D: $EURV_{C\,D} = (0.1043i - 0.0031) * Area$

EURV = _____ ac-ft

**2. Basin Shape: Length to Width Ratio**
(A basin length to width ratio of at least 2:1 will improve TSS reduction.)

L : W = 2.0 : 1

**3. Basin Side Slopes**

A) Basin Maximum Side Slopes
(Horizontal distance per unit vertical, 4:1 or flatter preferred)

Z = 4.00 ft / ft

**4. Inlet**

A) Describe means of providing energy dissipation at concentrated inflow locations:

## Design Procedure Form: Extended Detention Basin (EDB)



| | |
|---|---|
| **Designer:** | Marc A. Whorton |
| **Company:** | Classic Consulting Engineers and Surveyors |
| **Date:** | November 14, 2012 |
| **Project:** | Waterbury - PDR |
| **Location:** | SWQ Facility for Basin D6 |

**1. Basin Storage Volume**

A) Effective Imperviousness of Tributary Area, $I_a$ — $I_a$ = 53.0 %

B) Tributary Area's Imperviousness Ratio ($i = I_a / 100$) — i = 0.530

C) Contributing Watershed Area — Area = 11.300 ac

D) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm — $d_6$ = 0.42 in

E) Design Concept (Select EURV when also designing for flood control)

Choose One
- (•) Water Quality Capture Volume (WQCV)
- ( ) Excess Urban Runoff Volume (EURV)

F) Design Volume (1.2 WQCV) Based on 40-hour Drain Time
($V_{DESIGN} = (1.0 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i) / 12 * Area * 1.2$) — $V_{DESIGN}$ = 0.243 ac-ft

G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume
($V_{WQCV\ OTHER} = (d_6 * (V_{DESIGN} / 0.43))$) — $V_{DESIGN\ OTHER}$ = 0.237 ac-ft

H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired) — $V_{DESIGN\ USER}$ = _____ ac-ft

I) Predominant Watershed NRCS Soil Group

Choose One
- ( ) A
- (•) B
- ( ) C / D

J) Excess Urban Runoff Volume (EURV) Design Volume
For HSG A: $EURV_A = (0.1878i - 0.0104) * Area$
For HSG B: $EURV_B = (0.1178i - 0.0042) * Area$
For HSG C/D: $EURV_{C/D} = (0.1043i - 0.0031) * Area$

EURV = _____ ac-ft

**2. Basin Shape: Length to Width Ratio**
(A basin length to width ratio of at least 2:1 will improve TSS reduction.)

L : W = 2.0 : 1

**3. Basin Side Slopes**

A) Basin Maximum Side Slopes
(Horizontal distance per unit vertical, 4:1 or flatter preferred) — Z = 4.00 ft / ft

**4. Inlet**

A) Describe means of providing energy dissipation at concentrated inflow locations:

| Project Summary | |
|---|---|
| Title | POND 3C 5 YEAR EVENT |
| Engineer | |
| Company | |
| Date | 11/9/2012 |

Notes

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Subsection: Modified Rational Grand Summary

## Modified Rational Method

### Q = CiA * Units Conversion; Where conversion = 43560 / (12 * 3600)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5 | 25.700 | 0.538 | 0.333 | 3.010 | 41.98 | 28.90 | 1.156 | 0.381 |
| 5 | 4.700 | 0.450 | 0.250 | 3.460 | 7.38 | 5.00 | 0.152 | 0.051 |

Subsection: Master Network Summary

## Catchments Summary

| | | | | | |
|---|---|---|---|---|---|
| BASIN C1-C3 & D5 | Post-Development 5 yr | 5 | 1.152 | 0.300 | 41.98 |
| D5 | Post-Development 5 yr | 5 | 0.152 | 0.250 | 7.38 |

## Node Summary

| | | | | | |
|---|---|---|---|---|---|
| RELEASE | Post-Development 5 yr | 5 | 0.940 | 0.450 | 20.46 |

## Pond Summary

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| POND 3A (IN) | Post-Development 5 yr | 5 | 1.152 | 0.300 | 41.98 | (N/A) | (N/A) |
| POND 3A (OUT) | Post-Development 5 yr | 5 | 0.787 | 0.500 | 20.05 | 6,939.40 | 0.799 |

Subsection: I-D-F Table
Label: CO SPRINGS

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

**I-D-F Curve**

| [illegible] | [illegible] |
|---|---|
| 0.083 | 5.100 |
| 0.167 | 4.100 |
| 0.250 | 3.460 |
| 0.333 | 3.010 |
| 0.417 | 2.680 |
| 0.500 | 2.420 |
| 0.583 | 2.210 |
| 0.667 | 2.040 |
| 0.750 | 1.900 |
| 0.833 | 1.780 |
| 0.917 | 1.670 |
| 1.000 | 1.580 |

Subsection: Elevation-Area Volume Curve
Label: POND 3A

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

| | | | | | |
|---|---|---|---|---|---|
| 6,936.00 | 0.0 | 0.140 | 0.000 | 0.000 | 0.000 |
| 6,938.00 | 0.0 | 0.250 | 0.577 | 0.385 | 0.385 |
| 6,940.00 | 0.0 | 0.390 | 0.952 | 0.635 | 1.020 |
| 6,942.00 | 0.0 | 0.540 | 1.389 | 0.926 | 1.946 |

Subsection: Outlet Input Data
Label: Composite Outlet Structure - 1

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

| Requested Pond Water Surface Elevations | |
|---|---|
| Minimum (Headwater) | 6,936.00 ft |
| Increment (Headwater) | 0.50 ft |
| Maximum (Headwater) | 6,942.00 ft |

## Outlet Connectivity

| Structure Type | Outlet ID | Direction | Outlet | [illegible] | [illegible] |
|---|---|---|---|---|---|
| Inlet Box | Riser - 1 | Forward | Culvert - 1 | 6,938.00 | 6,942.00 |
| Culvert-Circular | Culvert - 1 | Forward | TW | 6,922.00 | 6,942.00 |
| Orifice-Circular | Orifice - 1 | Forward | TW | 6,936.00 | 6,942.00 |
| Tailwater Settings | Tailwater | | | (N/A) | (N/A) |

Subsection: Outlet Input Data
Label: Composite Outlet Structure - 1

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

| Structure ID: Culvert - 1<br>Structure Type: Culvert-Circular | |
|---|---|
| Number of Barrels | 1 |
| Diameter | 36.0 in |
| Length | 50.00 ft |
| Length (Computed Barrel) | 50.01 ft |
| Slope (Computed) | 0.020 ft/ft |

| Outlet Control Data | |
|---|---|
| Manning's n | 0.013 |
| Ke | 0.200 |
| Kb | 0.007 |
| Kr | 0.000 |
| Convergence Tolerance | 0.00 ft |

| Inlet Control Data | |
|---|---|
| Equation Form | Form 1 |
| K | 0.0045 |
| M | 2.0000 |
| C | 0.0317 |
| Y | 0.6900 |
| T1 ratio (HW/D) | 1.085 |
| T2 ratio (HW/D) | 1.187 |
| Slope Correction Factor | -0.500 |

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

| | | | |
|---|---|---|---|
| T1 Elevation | 6,925.26 ft | T1 Flow | 42.85 $ft^3/s$ |
| T2 Elevation | 6,925.56 ft | T2 Flow | 48.97 $ft^3/s$ |

| Structure ID: Riser - 1<br>Structure Type: Inlet Box | |
|---|---|
| Number of Openings | 1 |
| Elevation | 6,938.00 ft |
| Orifice Area | 10.2 ft² |
| Orifice Coefficient | 0.600 |
| Weir Length | 4.00 ft |
| Weir Coefficient | 3.00 (ft^0.5)/s |
| K Reverse | 1.000 |
| Manning's n | 0.000 |
| Kev, Charged Riser | 0.000 |
| Weir Submergence | False |
| Orifice H to crest | False |

| Structure ID: Orifice - 1<br>Structure Type: Orifice-Circular | |
|---|---|
| Number of Openings | 5 |
| Elevation | 6,936.00 ft |
| Orifice Diameter | 0.3 in |
| Orifice Coefficient | 0.600 |

| Structure ID: TW<br>Structure Type: TW Setup, DS Channel | |
|---|---|
| Tailwater Type | Free Outfall |

| Convergence Tolerances | |
|---|---|
| Maximum Iterations | 30 |
| Tailwater Tolerance (Minimum) | 0.01 ft |
| Tailwater Tolerance (Maximum) | 0.50 ft |
| Headwater Tolerance (Minimum) | 0.01 ft |
| Headwater Tolerance (Maximum) | 0.50 ft |
| Flow Tolerance (Minimum) | 0.001 ft³/s |
| Flow Tolerance (Maximum) | 10.000 ft³/s |

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Culvert - 1 (Culvert-Circular)

Mannings open channel maximum capacity: 101.46 ft³/s
Upstream ID = Riser - 1 (Inlet Box)
Downstream ID = Tailwater (Pond Outfall)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6,936.00 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,936.50 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,937.00 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,937.50 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,938.00 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,938.50 | 4.24 | 6,922.91 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,939.00 | 12.00 | 6,923.59 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,939.50 | 22.05 | 6,924.22 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,940.00 | 33.94 | 6,924.87 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,940.50 | 47.43 | 6,925.55 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,941.00 | 62.35 | 6,926.51 | Free Outfall | Free Outfall | 0.00 | 0.01 | (N/A) | 0.00 |
| 6,941.50 | 78.58 | 6,927.96 | Free Outfall | Free Outfall | 0.00 | 0.01 | (N/A) | 0.00 |
| 6,942.00 | 96.00 | 6,929.89 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |

| |
|---|
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| CRIT.DEPTH CONTROL Vh= .226ft Dcr= .644ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .406ft Dcr= 1.100ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .594ft Dcr= 1.510ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .811ft Dcr= 1.892ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= 1.088ft Dcr= 2.243ft CRIT.DEPTH Hev= .00ft |
| INLET CONTROL... Submerged: HW =4.51 |
| INLET CONTROL... Submerged: HW =5.96 |
| INLET CONTROL... Submerged: HW =7.89 |

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Riser - 1 (Inlet Box)

Upstream ID = (Pond Water Surface)
Downstream ID = Culvert - 1 (Culvert-Circular)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6,936.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,936.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,937.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,937.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,938.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,938.50 | 4.24 | 6,938.50 | Free Outfall | 6,922.91 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,939.00 | 12.00 | 6,939.00 | Free Outfall | 6,923.59 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,939.50 | 22.05 | 6,939.50 | Free Outfall | 6,924.22 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,940.00 | 33.94 | 6,940.00 | Free Outfall | 6,924.87 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,940.50 | 47.43 | 6,940.50 | Free Outfall | 6,925.55 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,941.00 | 62.35 | 6,941.00 | Free Outfall | 6,926.51 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,941.50 | 78.57 | 6,941.50 | Free Outfall | 6,927.96 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,942.00 | 96.00 | 6,942.00 | Free Outfall | 6,929.89 | 0.00 | 0.00 | (N/A) | 0.00 |

| |
|---|
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| Weir: H =0.5ft |
| Weir: H =1ft |
| Weir: H =1.5ft |
| Weir: H =2ft |
| Weir: H =2.5ft |
| Weir: H =3ft |
| Weir: H =3.5ft |
| Weir: H =4ft |

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)
---
Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

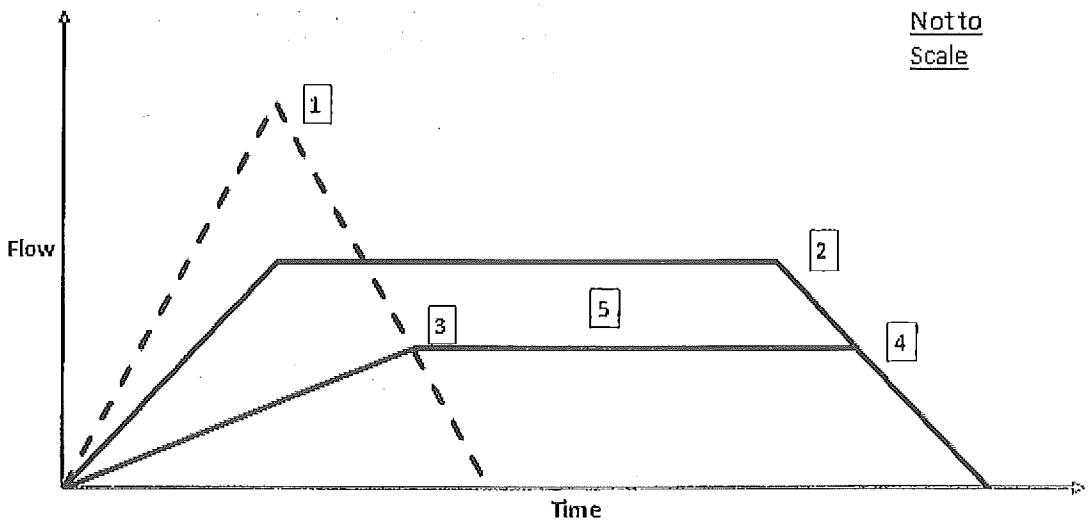
| Water Surface Elevation (ft) | Flow (cfs) | Tailwater Elevation (ft) | Convergence Error (cfs) |
|---|---|---|---|
| 6,936.00 | 0.00 | (N/A) | 0.00 |
| 6,936.50 | 0.01 | (N/A) | 0.00 |
| 6,937.00 | 0.01 | (N/A) | 0.00 |
| 6,937.50 | 0.01 | (N/A) | 0.00 |
| 6,938.00 | 0.01 | (N/A) | 0.00 |
| 6,938.50 | 0.01 | (N/A) | 0.00 |
| 6,939.00 | 0.01 | (N/A) | 0.00 |
| 6,939.50 | 0.02 | (N/A) | 0.00 |
| 6,940.00 | 0.02 | (N/A) | 0.00 |
| 6,940.50 | 0.02 | (N/A) | 0.00 |
| 6,941.00 | 0.02 | (N/A) | 0.00 |
| 6,941.50 | 0.02 | (N/A) | 0.00 |
| 6,942.00 | 0.02 | (N/A) | 0.00 |

| Comments |
|---|
| WS below an invert; no flow. |
| H =.49 |
| H =.99 |
| H =1.49 |
| H =1.99 |
| H =2.49 |
| H =2.99 |
| H =3.49 |
| H =3.99 |
| H =4.49 |
| H =4.99 |
| H =5.49 |
| H =5.99 |

Subsection: Modified Rational Graph
Label: BASIN C1-C3 & D5

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

| Method Type | Method T |
|---|---|
| Time of Duration (Modified Rational, Critical) | 0.333 hours |




| [1] | | | [2] | | |
|---|---|---|---|---|---|
| Time of Concentration (Modified Rational, Composite) | 0.280 | hours | Time of Duration (Modified Rational, Critical) | 0.333 | hours |
| Intensity (Modified Rational, Peak) | 3.298 | in/h | Intensity (Modified Rational, Critical) | 3.010 | in/h |
| Flow (Modified Rational, Peak) | 46.00 | ft³/s | Flow (Modified Rational, Critical) | 41.98 | ft³/s |

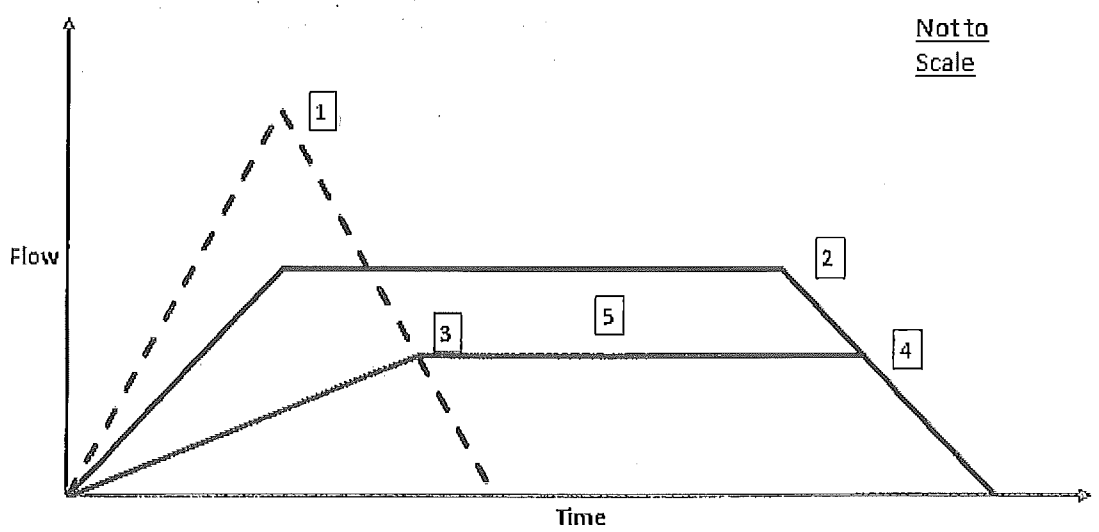
| [3] | |
|---|---|
| First Outflow Breakpoint (Modified Rational, Method T) | 0.421 hours |
| Flow (Modified Rational, Allowable) | 28.90 ft³/s |

| [4] | | | [5] | | |
|---|---|---|---|---|---|
| Second Outflow Breakpoint (Modified Rational) | 0.384 | hours | Storage (Modified Rational, Estimated) | 0.381 | ac-ft |
| Flow (Modified Rational, Allowable) | 28.90 | ft³/s | | | |

Subsection: Modified Rational Graph
Label: D5

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

| Method Type | Method T |
|---|---|
| Time of Duration (Modified Rational, Critical) | 0.250 hours |




| [1] | | | [2] | | |
|---|---|---|---|---|---|
| Time of Concentration (Modified Rational, Composite) | 0.218 | hours | Time of Duration (Modified Rational, Critical) | 0.250 | hours |
| Intensity (Modified Rational, Peak) | 3.706 | in/h | Intensity (Modified Rational, Critical) | 3.460 | in/h |
| Flow (Modified Rational, Peak) | 7.90 | ft³/s | Flow (Modified Rational, Critical) | 7.38 | ft³/s |

| [3] | |
|---|---|
| First Outflow Breakpoint (Modified Rational, Method T) | 0.320 hours |
| Flow (Modified Rational, Allowable) | 5.00 ft³/s |

| [4] | | | [5] | | |
|---|---|---|---|---|---|
| Second Outflow Breakpoint (Modified Rational) | 0.298 | hours | Storage (Modified Rational, Estimated) | 0.051 | ac-ft |
| Flow (Modified Rational, Allowable) | 5.00 | ft³/s | | | |

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| Project Summary | |
|---|---|
| Title | POND 3C 100 YEAR EVENT |
| Engineer | |
| Company | |
| Date | 11/9/2012 |

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| BASIN C1-C3 & D5 | | |
| | Modified Rational Graph, 100 years | 12 |
| D5 | | |
| | Modified Rational Graph, 100 years | 13 |

Subsection: Modified Rational Grand Summary

## Modified Rational Method

### Q = CiA * Units Conversion; Where conversion = 43560 / (12 * 3600)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 100 | 25.700 | 0.638 | 0.333 | 5.360 | 88.65 | 72.05 | 2.442 | 0.516 |
| 100 | 4.700 | 0.550 | 0.250 | 6.160 | 16.06 | 15.00 | 0.332 | 0.030 |

Subsection: Master Network Summary

## Catchments Summary

| | | | | | |
|---|---|---|---|---|---|
| BASIN C1-C3 & D5 | Post-Development 100 yr | 100 | 2.433 | 0.300 | 88.65 |
| D5 | Post-Development 100 yr | 100 | 0.332 | 0.250 | 16.06 |

## Node Summary

| | | | | | |
|---|---|---|---|---|---|
| RELEASE | Post-Development 100 yr | 100 | 2.400 | 0.400 | 57.99 |

## Pond Summary

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| POND 3A (IN) | Post-Development 100 yr | 100 | 2.433 | 0.300 | 88.65 | (N/A) | (N/A) |
| POND 3A (OUT) | Post-Development 100 yr | 100 | 2.068 | 0.450 | 54.60 | 6,940.74 | 1.327 |

Subsection: I-D-F Table
Label: CO SPRINGS

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

**I-D-F Curve**

| [illegible] (hours) | [illegible] (in/hr) |
|---|---|
| 0.083 | 9.070 |
| 0.167 | 7.290 |
| 0.250 | 6.160 |
| 0.333 | 5.360 |
| 0.417 | 4.770 |
| 0.500 | 4.310 |
| 0.583 | 3.940 |
| 0.667 | 3.630 |
| 0.750 | 3.380 |
| 0.833 | 3.160 |
| 0.917 | 2.980 |
| 1.000 | 2.810 |

Subsection: Elevation-Area Volume Curve
Label: POND 3A

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|
| 6,936.00 | 0.0 | 0.140 | 0.000 | 0.000 | 0.000 |
| 6,938.00 | 0.0 | 0.250 | 0.577 | 0.385 | 0.385 |
| 6,940.00 | 0.0 | 0.390 | 0.952 | 0.635 | 1.020 |
| 6,942.00 | 0.0 | 0.540 | 1.389 | 0.926 | 1.946 |

Subsection: Outlet Input Data
Label: Composite Outlet Structure - 1

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

| Requested Pond Water Surface Elevations | |
|---|---|
| Minimum (Headwater) | 6,936.00 ft |
| Increment (Headwater) | 0.50 ft |
| Maximum (Headwater) | 6,942.00 ft |

## Outlet Connectivity

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|
| Inlet Box | Riser - 1 | Forward | Culvert - 1 | 6,938.00 | 6,942.00 |
| Culvert-Circular | Culvert - 1 | Forward | TW | 6,922.00 | 6,942.00 |
| Orifice-Circular | Orifice - 1 | Forward | TW | 6,936.00 | 6,942.00 |
| Tailwater Settings | Tailwater | | | (N/A) | (N/A) |

| Structure ID: Culvert - 1<br>Structure Type: Culvert-Circular | |
|---|---|
| Number of Barrels | 1 |
| Diameter | 36.0 in |
| Length | 50.00 ft |
| Length (Computed Barrel) | 50.01 ft |
| Slope (Computed) | 0.020 ft/ft |

| Outlet Control Data | |
|---|---|
| Manning's n | 0.013 |
| Ke | 0.200 |
| Kb | 0.007 |
| Kr | 0.000 |
| Convergence Tolerance | 0.00 ft |

| Inlet Control Data | |
|---|---|
| Equation Form | Form 1 |
| K | 0.0045 |
| M | 2.0000 |
| C | 0.0317 |
| Y | 0.6900 |
| T1 ratio (HW/D) | 1.085 |
| T2 ratio (HW/D) | 1.187 |
| Slope Correction Factor | -0.500 |

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

| | | | |
|---|---|---|---|
| T1 Elevation | 6,925.26 ft | T1 Flow | 42.85 $ft^3/s$ |
| T2 Elevation | 6,925.56 ft | T2 Flow | 48.97 $ft^3/s$ |

| Structure ID: Riser - 1<br>Structure Type: Inlet Box | |
|---|---|
| Number of Openings | 1 |
| Elevation | 6,938.00 ft |
| Orifice Area | 10.2 ft² |
| Orifice Coefficient | 0.600 |
| Weir Length | 4.00 ft |
| Weir Coefficient | 3.00 (ft^0.5)/s |
| K Reverse | 1.000 |
| Manning's n | 0.000 |
| Kev, Charged Riser | 0.000 |
| Weir Submergence | False |
| Orifice H to crest | False |

| Structure ID: Orifice - 1<br>Structure Type: Orifice-Circular | |
|---|---|
| Number of Openings | 5 |
| Elevation | 6,936.00 ft |
| Orifice Diameter | 0.3 in |
| Orifice Coefficient | 0.600 |

| Structure ID: TW<br>Structure Type: TW Setup, DS Channel | |
|---|---|
| Tailwater Type | Free Outfall |

| Convergence Tolerances | |
|---|---|
| Maximum Iterations | 30 |
| Tailwater Tolerance (Minimum) | 0.01 ft |
| Tailwater Tolerance (Maximum) | 0.50 ft |
| Headwater Tolerance (Minimum) | 0.01 ft |
| Headwater Tolerance (Maximum) | 0.50 ft |
| Flow Tolerance (Minimum) | 0.001 ft³/s |
| Flow Tolerance (Maximum) | 10.000 ft³/s |

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Culvert - 1 (Culvert-Circular)
---
Mannings open channel maximum capacity: 101.46 ft³/s
Upstream ID = Riser - 1 (Inlet Box)
Downstream ID = Tailwater (Pond Outfall)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6,936.00 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,936.50 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,937.00 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,937.50 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,938.00 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,938.50 | 4.24 | 6,922.91 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,939.00 | 12.00 | 6,923.59 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,939.50 | 22.05 | 6,924.22 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,940.00 | 33.94 | 6,924.87 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,940.50 | 47.43 | 6,925.55 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,941.00 | 62.35 | 6,926.51 | Free Outfall | Free Outfall | 0.00 | 0.01 | (N/A) | 0.00 |
| 6,941.50 | 78.58 | 6,927.96 | Free Outfall | Free Outfall | 0.00 | 0.01 | (N/A) | 0.00 |
| 6,942.00 | 96.00 | 6,929.89 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |

| |
|---|
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| CRIT.DEPTH CONTROL Vh= .226ft Dcr= .644ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .406ft Dcr= 1.100ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .594ft Dcr= 1.510ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .811ft Dcr= 1.892ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= 1.088ft Dcr= 2.243ft CRIT.DEPTH Hev= .00ft |
| INLET CONTROL... Submerged: HW =4.51 |
| INLET CONTROL... Submerged: HW =5.96 |
| INLET CONTROL... Submerged: HW =7.89 |

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Riser - 1 (Inlet Box)
---
Upstream ID = (Pond Water Surface)
Downstream ID = Culvert - 1 (Culvert-Circular)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6,936.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,936.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,937.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,937.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,938.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,938.50 | 4.24 | 6,938.50 | Free Outfall | 6,922.91 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,939.00 | 12.00 | 6,939.00 | Free Outfall | 6,923.59 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,939.50 | 22.05 | 6,939.50 | Free Outfall | 6,924.22 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,940.00 | 33.94 | 6,940.00 | Free Outfall | 6,924.87 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,940.50 | 47.43 | 6,940.50 | Free Outfall | 6,925.55 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,941.00 | 62.35 | 6,941.00 | Free Outfall | 6,926.51 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,941.50 | 78.57 | 6,941.50 | Free Outfall | 6,927.96 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,942.00 | 96.00 | 6,942.00 | Free Outfall | 6,929.89 | 0.00 | 0.00 | (N/A) | 0.00 |

| |
|---|
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| Weir: H =0.5ft |
| Weir: H =1ft |
| Weir: H =1.5ft |
| Weir: H =2ft |
| Weir: H =2.5ft |
| Weir: H =3ft |
| Weir: H =3.5ft |
| Weir: H =4ft |

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

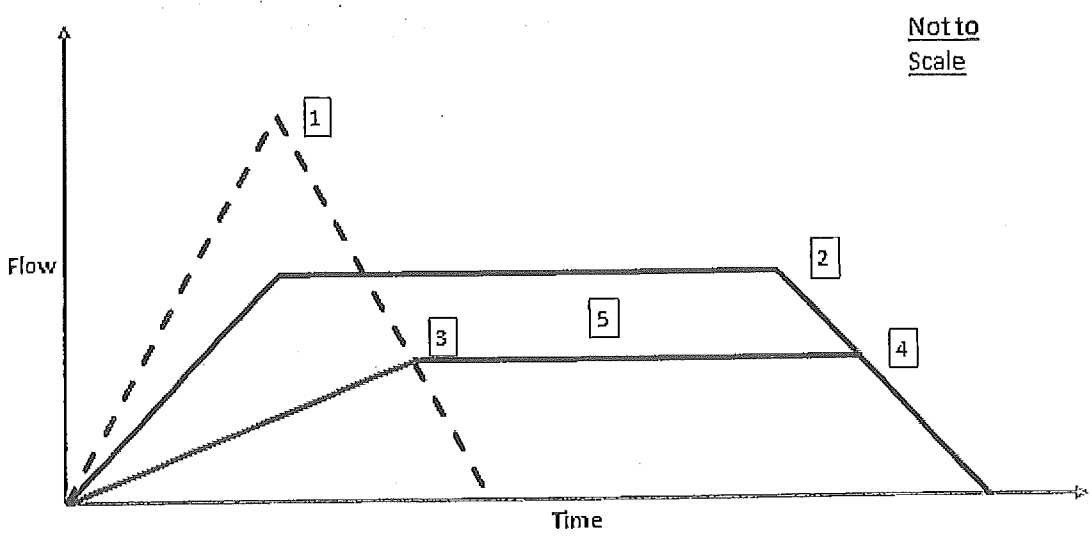
| | | | |
|---|---|---|---|
| 6,936.00 | 0.00 | (N/A) | 0.00 |
| 6,936.50 | 0.01 | (N/A) | 0.00 |
| 6,937.00 | 0.01 | (N/A) | 0.00 |
| 6,937.50 | 0.01 | (N/A) | 0.00 |
| 6,938.00 | 0.01 | (N/A) | 0.00 |
| 6,938.50 | 0.01 | (N/A) | 0.00 |
| 6,939.00 | 0.01 | (N/A) | 0.00 |
| 6,939.50 | 0.02 | (N/A) | 0.00 |
| 6,940.00 | 0.02 | (N/A) | 0.00 |
| 6,940.50 | 0.02 | (N/A) | 0.00 |
| 6,941.00 | 0.02 | (N/A) | 0.00 |
| 6,941.50 | 0.02 | (N/A) | 0.00 |
| 6,942.00 | 0.02 | (N/A) | 0.00 |

| |
|---|
| WS below an invert; no flow. |
| H =.49 |
| H =.99 |
| H =1.49 |
| H =1.99 |
| H =2.49 |
| H =2.99 |
| H =3.49 |
| H =3.99 |
| H =4.49 |
| H =4.99 |
| H =5.49 |
| H =5.99 |

Subsection: Modified Rational Graph
Label: BASIN C1-C3 & D5

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

| Method Type | Method T |
|---|---|
| Time of Duration (Modified Rational, Critical) | 0.333 hours |




| [1] | | | [2] | | |
|---|---|---|---|---|---|
| Time of Concentration (Modified Rational, Composite) | 0.280 | hours | Time of Duration (Modified Rational, Critical) | 0.333 | hours |
| Intensity (Modified Rational, Peak) | 5.872 | in/h | Intensity (Modified Rational, Critical) | 5.360 | in/h |
| Flow (Modified Rational, Peak) | 97.11 | ft³/s | Flow (Modified Rational, Critical) | 88.65 | ft³/s |

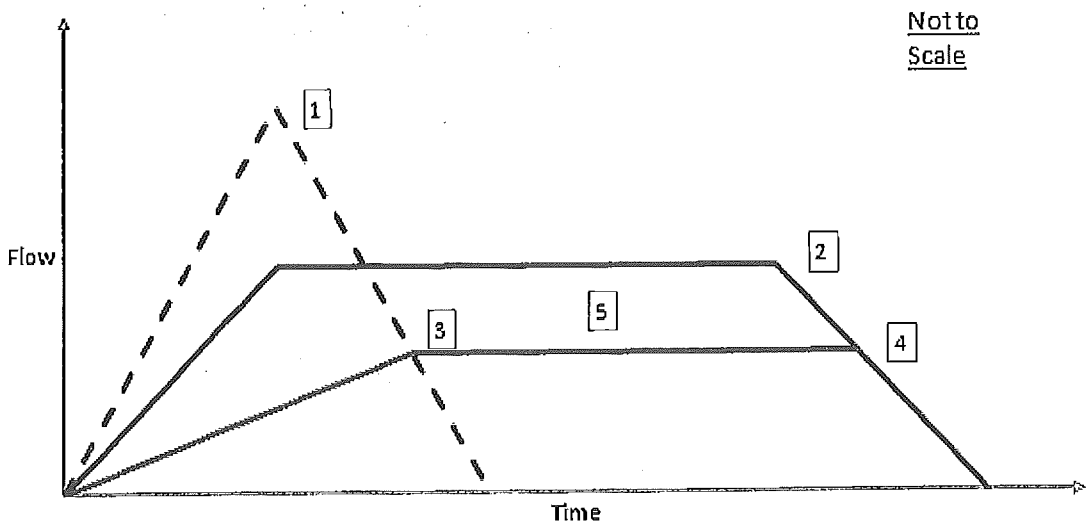
| [3] | |
|---|---|
| First Outflow Breakpoint (Modified Rational, Method T) | 0.386 hours |
| Flow (Modified Rational, Allowable) | 72.05 ft³/s |

| [4] | | | [5] | | |
|---|---|---|---|---|---|
| Second Outflow Breakpoint (Modified Rational) | 0.352 | hours | Storage (Modified Rational, Estimated) | 0.516 | ac-ft |
| Flow (Modified Rational, Allowable) | 72.05 | ft³/s | | | |

Subsection: Modified Rational Graph
Label: D5

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

| Method Type | Method T |
|---|---|
| Time of Duration (Modified Rational, Critical) | 0.250 hours |




| [1] | | | [2] | | |
|---|---|---|---|---|---|
| Time of Concentration (Modified Rational, Composite) | 0.218 | hours | Time of Duration (Modified Rational, Critical) | 0.250 | hours |
| Intensity (Modified Rational, Peak) | 6.594 | in/h | Intensity (Modified Rational, Critical) | 6.160 | in/h |
| Flow (Modified Rational, Peak) | 17.19 | ft³/s | Flow (Modified Rational, Critical) | 16.06 | ft³/s |

| [3] | |
|---|---|
| First Outflow Breakpoint (Modified Rational, Method T) | 0.264 hours |
| Flow (Modified Rational, Allowable) | 15.00 ft³/s |

| [4] | | | [5] | | |
|---|---|---|---|---|---|
| Second Outflow Breakpoint (Modified Rational) | 0.246 | hours | Storage (Modified Rational, Estimated) | 0.030 | ac-ft |
| Flow (Modified Rational, Allowable) | 15.00 | ft³/s | | | |

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| Project Summary | |
|---|---|
| Title | POND 2A, 2B, 2C, 5 YEAR EVENT |
| Engineer | |
| Company | |
| Date | 8/15/2012 |

| Notes |
|---|

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Subsection: Modified Rational Grand Summary

## Modified Rational Method

### Q = CiA * Units Conversion; Where conversion = 43560 / (12 * 3600)

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|---|---|---|
| 5 | 67.400 | 0.488 | 0.500 | 2.420 | 80.26 | 70.44 | 3.317 | 0.557 |
| 5 | 16.100 | 0.511 | 0.383 | 2.812 | 23.33 | 11.43 | 0.739 | 0.388 |
| 5 | 15.900 | 0.503 | 0.383 | 2.812 | 22.65 | 11.29 | 0.718 | 0.371 |
| 5 | 44.100 | 0.554 | 0.333 | 3.010 | 74.18 | 62.47 | 2.043 | 0.375 |
| 5 | 16.400 | 0.633 | 0.467 | 2.524 | 26.42 | 11.65 | 1.019 | 0.584 |

Subsection: Master Network Summary

## Catchments Summary

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|
| BASIN B-22-OS-8 | Post-Development 5 year | 5 | 1.017 | 0.250 | 26.42 |
| BASIN B1-B8 | Post-Development 5 year | 5 | 3.317 | 0.400 | 80.26 |
| BASIN B12-B14 | Post-Development 5 year | 5 | 0.718 | 0.250 | 22.65 |
| BASIN B16-B21 | Post-Development 5 year | 5 | 2.037 | 0.300 | 74.18 |
| BASIN B9-B11 | Post-Development 5 year | 5 | 0.738 | 0.250 | 23.33 |

## Node Summary

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|
| RELEASE | Post-Development 5 year | 5 | 6.268 | 0.600 | 43.23 |

## Pond Summary

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|---|---|
| POND 2A (IN) | Post-Development 5 year | 5 | 3.317 | 0.400 | 80.26 | (N/A) | (N/A) |
| POND 2A (OUT) | Post-Development 5 year | 5 | 3.265 | 0.650 | 44.83 | 6,935.32 | 1.706 |
| POND 2B (IN) | Post-Development 5 year | 5 | 4.003 | 0.450 | 54.30 | (N/A) | (N/A) |
| POND 2B (OUT) | Post-Development 5 year | 5 | 3.967 | 0.950 | 32.82 | 6,921.80 | 1.359 |
| POND 2C (IN) | Post-Development 5 year | 5 | 7.738 | 0.350 | 137.24 | (N/A) | (N/A) |
| POND 2C (OUT) | Post-Development 5 year | 5 | 6.268 | 0.600 | 43.23 | 6,897.35 | 3.697 |

Subsection: I-D-F Table
Label: CO SPRINGS

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

**I-D-F Curve**

| [illegible] | [illegible] |
|---|---|
| 0.083 | 5.100 |
| 0.167 | 4.100 |
| 0.250 | 3.460 |
| 0.333 | 3.010 |
| 0.417 | 2.680 |
| 0.500 | 2.420 |
| 0.583 | 2.210 |
| 0.667 | 2.040 |
| 0.750 | 1.900 |
| 0.833 | 1.780 |
| 0.917 | 1.670 |
| 1.000 | 1.580 |

Subsection: Elevation-Area Volume Curve
Label: POND 2A

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

| | | | | | |
|---|---|---|---|---|---|
| 6,930.00 | 0.0 | 0.010 | 0.000 | 0.000 | 0.000 |
| 6,932.00 | 0.0 | 0.320 | 0.387 | 0.258 | 0.258 |
| 6,934.00 | 0.0 | 0.460 | 1.164 | 0.776 | 1.033 |
| 6,936.00 | 0.0 | 0.610 | 1.600 | 1.066 | 2.100 |
| 6,938.00 | 0.0 | 0.750 | 2.036 | 1.358 | 3.458 |
| 6,940.00 | 0.0 | 0.910 | 2.486 | 1.657 | 5.115 |

Subsection: Elevation-Area Volume Curve
Label: POND 2B

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

| | | | | | |
|---|---|---|---|---|---|
| 6,916.00 | 0.0 | 0.010 | 0.000 | 0.000 | 0.000 |
| 6,918.00 | 0.0 | 0.190 | 0.244 | 0.162 | 0.162 |
| 6,920.00 | 0.0 | 0.330 | 0.770 | 0.514 | 0.676 |
| 6,922.00 | 0.0 | 0.440 | 1.151 | 0.767 | 1.443 |
| 6,924.00 | 0.0 | 0.560 | 1.496 | 0.998 | 2.441 |
| 6,926.00 | 0.0 | 0.680 | 1.857 | 1.238 | 3.679 |

Subsection: Elevation-Area Volume Curve
Label: POND 2C

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|
| 6,891.00 | 0.0 | 0.000 | 0.000 | 0.000 | 0.000 |
| 6,892.00 | 0.0 | 0.070 | 0.070 | 0.023 | 0.023 |
| 6,894.00 | 0.0 | 0.720 | 1.014 | 0.676 | 0.700 |
| 6,896.00 | 0.0 | 0.930 | 2.468 | 1.646 | 2.345 |
| 6,898.00 | 0.0 | 1.150 | 3.114 | 2.076 | 4.421 |
| 6,900.00 | 0.0 | 1.270 | 3.629 | 2.419 | 6.840 |

| Requested Pond Water Surface Elevations | |
|---|---|
| Minimum (Headwater) | 6,930.00 ft |
| Increment (Headwater) | 0.50 ft |
| Maximum (Headwater) | 6,940.00 ft |

## Outlet Connectivity

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] (ft) | [illegible] (ft) |
|---|---|---|---|---|---|
| Culvert-Circular<br>Tailwater Settings | Culvert - 1<br>Tailwater | Forward | TW | 6,931.00<br>(N/A) | 6,940.00<br>(N/A) |

| Structure ID: Culvert - 1<br>Structure Type: Culvert-Circular | |
|---|---|
| Number of Barrels | 1 |
| Diameter | 30.0 in |
| Length | 50.00 ft |
| Length (Computed Barrel) | 50.04 ft |
| Slope (Computed) | 0.040 ft/ft |

| Outlet Control Data | |
|---|---|
| Manning's n | 0.013 |
| Ke | 0.200 |
| Kb | 0.009 |
| Kr | 0.000 |
| Convergence Tolerance | 0.00 ft |

| Inlet Control Data | |
|---|---|
| Equation Form | Form 1 |
| K | 0.0045 |
| M | 2.0000 |
| C | 0.0317 |
| Y | 0.6900 |
| T1 ratio (HW/D) | 1.075 |
| T2 ratio (HW/D) | 1.177 |
| Slope Correction Factor | -0.500 |

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

| | | | |
|---|---|---|---|
| T1 Elevation | 6,933.69 ft | T1 Flow | 27.16 ft³/s |
| T2 Elevation | 6,933.94 ft | T2 Flow | 31.05 ft³/s |

Structure ID: TW
Structure Type: TW Setup, DS Channel

| Tailwater Type | Free Outfall |
|---|---|
| **Convergence Tolerances** | |
| Maximum Iterations | 30 |
| Tailwater Tolerance (Minimum) | 0.01 ft |
| Tailwater Tolerance (Maximum) | 0.50 ft |
| Headwater Tolerance (Minimum) | 0.01 ft |
| Headwater Tolerance (Maximum) | 0.50 ft |
| Flow Tolerance (Minimum) | 0.001 $ft^3/s$ |
| Flow Tolerance (Maximum) | 10.000 $ft^3/s$ |

Subsection: Individual Outlet Curves
Label: POND 2A OUT

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Culvert - 1 (Culvert-Circular)
---
Mannings open channel maximum capacity: 88.24 ft³/s
Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

| [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|
| 6,930.00 | 0.00 | (N/A) | 0.00 |
| 6,930.50 | 0.00 | (N/A) | 0.00 |
| 6,931.00 | 0.00 | (N/A) | 0.00 |
| 6,931.50 | 1.19 | (N/A) | 0.00 |
| 6,932.00 | 4.51 | (N/A) | 0.00 |
| 6,932.50 | 9.58 | (N/A) | 0.00 |
| 6,933.00 | 15.97 | (N/A) | 0.00 |
| 6,933.50 | 23.17 | (N/A) | 0.00 |
| 6,934.00 | 30.71 | (N/A) | 0.00 |
| 6,934.50 | 37.24 | (N/A) | 0.00 |
| 6,935.00 | 42.03 | (N/A) | 0.00 |
| 6,935.50 | 46.34 | (N/A) | 0.00 |
| 6,936.00 | 50.27 | (N/A) | 0.00 |
| 6,936.50 | 53.92 | (N/A) | 0.00 |
| 6,937.00 | 57.34 | (N/A) | 0.00 |
| 6,937.50 | 60.56 | (N/A) | 0.00 |
| 6,938.00 | 63.62 | (N/A) | 0.00 |
| 6,938.50 | 66.54 | (N/A) | 0.00 |
| 6,939.00 | 69.34 | (N/A) | 0.00 |
| 6,939.50 | 72.03 | (N/A) | 0.00 |
| 6,940.00 | 74.61 | (N/A) | 0.00 |

| [illegible] |
|---|
| Upstream HW & DNstream TW < Inv.El |
| Upstream HW & DNstream TW < Inv.El |
| Upstream HW & DNstream TW < Inv.El |
| CRIT.DEPTH CONTROL Vh= .122ft Dcr= .354ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .250ft Dcr= .700ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .389ft Dcr= 1.033ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .542ft Dcr= 1.350ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .717ft Dcr= 1.639ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .926ft Dcr= 1.889ft CRIT.DEPTH Hev= .00ft |
| INLET CONTROL... Submerged: HW =3.50 |

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Culvert - 1 (Culvert-Circular)

Mannings open channel maximum capacity: 88.24 ft³/s
Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

| Computation Messages |
| --- |
| INLET CONTROL... Submerged: HW =4.00 |
| INLET CONTROL... Submerged: HW =4.50 |
| INLET CONTROL... Submerged: HW =5.00 |
| INLET CONTROL... Submerged: HW =5.50 |
| INLET CONTROL... Submerged: HW =6.00 |
| INLET CONTROL... Submerged: HW =6.50 |
| INLET CONTROL... Submerged: HW =7.00 |
| INLET CONTROL... Submerged: HW =7.50 |
| INLET CONTROL... Submerged: HW =8.00 |
| INLET CONTROL... Submerged: HW =8.50 |
| INLET CONTROL... Submerged: HW =9.00 |

| Requested Pond Water Surface Elevations | |
|---|---|
| Minimum (Headwater) | 6,916.00 ft |
| Increment (Headwater) | 0.50 ft |
| Maximum (Headwater) | 6,926.00 ft |

## Outlet Connectivity

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] (ft) | [illegible] (ft) |
|---|---|---|---|---|---|
| Culvert-Circular<br>Tailwater Settings | Culvert - 1<br>Tailwater | Forward | TW | 6,917.00<br>(N/A) | 6,926.00<br>(N/A) |

| Structure ID: Culvert - 1<br>Structure Type: Culvert-Circular | |
|---|---|
| Number of Barrels | 1 |
| Diameter | 24.0 in |
| Length | 50.00 ft |
| Length (Computed Barrel) | 50.04 ft |
| Slope (Computed) | 0.040 ft/ft |

| Outlet Control Data | |
|---|---|
| Manning's n | 0.013 |
| Ke | 0.200 |
| Kb | 0.012 |
| Kr | 0.000 |
| Convergence Tolerance | 0.00 ft |

| Inlet Control Data | |
|---|---|
| Equation Form | Form 1 |
| K | 0.0045 |
| M | 2.0000 |
| C | 0.0317 |
| Y | 0.6900 |
| T1 ratio (HW/D) | 1.075 |
| T2 ratio (HW/D) | 1.177 |
| Slope Correction Factor | -0.500 |

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

| | | | |
|---|---|---|---|
| T1 Elevation | 6,919.15 ft | T1 Flow | 15.55 ft³/s |
| T2 Elevation | 6,919.35 ft | T2 Flow | 17.77 ft³/s |

Structure ID: TW
Structure Type: TW Setup, DS Channel

| Tailwater Type | Free Outfall |
|---|---|
| **Convergence Tolerances** | |
| Maximum Iterations | 30 |
| Tailwater Tolerance (Minimum) | 0.01 ft |
| Tailwater Tolerance (Maximum) | 0.50 ft |
| Headwater Tolerance (Minimum) | 0.01 ft |
| Headwater Tolerance (Maximum) | 0.50 ft |
| Flow Tolerance (Minimum) | 0.001 $ft^3/s$ |
| Flow Tolerance (Maximum) | 10.000 $ft^3/s$ |

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Culvert - 1 (Culvert-Circular)

Mannings open channel maximum capacity: 48.67 ft³/s
Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

| [illegible] (ft) | Flow (cfs) | Tailwater Elevation (ft) | Submergence (ft) |
|---|---|---|---|
| 6,916.00 | 0.00 | (N/A) | 0.00 |
| 6,916.50 | 0.00 | (N/A) | 0.00 |
| 6,917.00 | 0.00 | (N/A) | 0.00 |
| 6,917.50 | 1.05 | (N/A) | 0.00 |
| 6,918.00 | 3.92 | (N/A) | 0.00 |
| 6,918.50 | 8.17 | (N/A) | 0.00 |
| 6,919.00 | 13.27 | (N/A) | 0.00 |
| 6,919.50 | 18.65 | (N/A) | 0.00 |
| 6,920.00 | 22.73 | (N/A) | 0.00 |
| 6,920.50 | 25.93 | (N/A) | 0.00 |
| 6,921.00 | 28.78 | (N/A) | 0.00 |
| 6,921.50 | 31.36 | (N/A) | 0.00 |
| 6,922.00 | 33.76 | (N/A) | 0.00 |
| 6,922.50 | 35.99 | (N/A) | 0.00 |
| 6,923.00 | 38.09 | (N/A) | 0.00 |
| 6,923.50 | 40.08 | (N/A) | 0.00 |
| 6,924.00 | 41.98 | (N/A) | 0.00 |
| 6,924.50 | 43.79 | (N/A) | 0.00 |
| 6,925.00 | 45.54 | (N/A) | 0.00 |
| 6,925.50 | 47.21 | (N/A) | 0.00 |
| 6,926.00 | 48.83 | (N/A) | 0.00 |

| [illegible] |
|---|
| Upstream HW & DNstream TW < Inv.El |
| Upstream HW & DNstream TW < Inv.El |
| Upstream HW & DNstream TW < Inv.El |
| CRIT.DEPTH CONTROL Vh= .123ft Dcr= .354ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .255ft Dcr= .695ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .402ft Dcr= 1.018ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .574ft Dcr= 1.311ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .787ft Dcr= 1.555ft CRIT.DEPTH Hev= .00ft |
| INLET CONTROL... Submerged: HW =3.00 |
| INLET CONTROL... Submerged: HW =3.50 |

Subsection: Individual Outlet Curves
Label: POND 2B OUT

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Culvert - 1 (Culvert-Circular)
---
Mannings open channel maximum capacity: 48.67 ft³/s
Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

| [illegible] |
|---|
| INLET CONTROL... Submerged: HW =4.00 |
| INLET CONTROL... Submerged: HW =4.50 |
| INLET CONTROL... Submerged: HW =5.00 |
| INLET CONTROL... Submerged: HW =5.50 |
| INLET CONTROL... Submerged: HW =6.00 |
| INLET CONTROL... Submerged: HW =6.50 |
| INLET CONTROL... Submerged: HW =7.00 |
| INLET CONTROL... Submerged: HW =7.50 |
| INLET CONTROL... Submerged: HW =8.00 |
| INLET CONTROL... Submerged: HW =8.50 |
| INLET CONTROL... Submerged: HW =9.00 |

| Requested Pond Water Surface Elevations | |
|---|---|
| Minimum (Headwater) | 6,891.00 ft |
| Increment (Headwater) | 0.50 ft |
| Maximum (Headwater) | 6,900.00 ft |

## Outlet Connectivity

| Structure Type | Outlet ID | Direction | Outfall | US (ft) | DS (ft) |
|---|---|---|---|---|---|
| Orifice-Area | Orifice - 1 | Forward | Culvert - 1 | 6,892.00 | 6,900.00 |
| Inlet Box | Riser - 2 | Forward | Culvert - 1 | 6,897.40 | 6,900.00 |
| Inlet Box | Riser - 1 | Forward | Culvert - 1 | 6,895.00 | 6,900.00 |
| Culvert-Circular | Culvert - 1 | Forward | TW | 6,892.00 | 6,900.00 |
| Tailwater Settings | Tailwater | | | (N/A) | (N/A) |

| Structure ID: Orifice - 1<br>Structure Type: Orifice-Area | |
|---|---|
| Number of Openings | 12 |
| Elevation | 6,892.00 ft |
| Orifice Area | 0.1 ft² |
| Top Elevation | 6,898.00 ft |
| Datum Elevation | 6,992.00 ft |
| Orifice Coefficient | 0.600 |

| Structure ID: Riser - 1<br>Structure Type: Inlet Box | |
|---|---|
| Number of Openings | 1 |
| Elevation | 6,895.00 ft |
| Orifice Area | 10.2 ft² |
| Orifice Coefficient | 0.600 |
| Weir Length | 4.00 ft |
| Weir Coefficient | 3.00 (ft^0.5)/s |
| K Reverse | 1.000 |
| Manning's n | 0.000 |
| Kev, Charged Riser | 0.000 |
| Weir Submergence | False |
| Orifice H to crest | False |

| Structure ID: Culvert - 1<br>Structure Type: Culvert-Circular | |
|---|---|
| Number of Barrels | 1 |
| Diameter | 54.0 in |
| Length | 100.00 ft |
| Length (Computed Barrel) | 100.02 ft |
| Slope (Computed) | 0.020 ft/ft |

| Outlet Control Data | |
|---|---|
| Manning's n | 0.013 |
| Ke | 0.200 |
| Kb | 0.004 |
| Kr | 0.000 |
| Convergence Tolerance | 0.00 ft |

| Inlet Control Data | |
|---|---|
| Equation Form | Form 1 |
| K | 0.0045 |
| M | 2.0000 |
| C | 0.0317 |
| Y | 0.6900 |
| T1 ratio (HW/D) | 1.085 |
| T2 ratio (HW/D) | 1.187 |
| Slope Correction Factor | -0.500 |

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

| | | | |
|---|---|---|---|
| T1 Elevation | 6,896.88 ft | T1 Flow | 118.08 ft³/s |
| T2 Elevation | 6,897.34 ft | T2 Flow | 134.95 ft³/s |

| Structure ID: Riser - 2<br>Structure Type: Inlet Box | |
|---|---|
| Number of Openings | 1 |
| Elevation | 6,897.40 ft |
| Orifice Area | 16.0 ft² |
| Orifice Coefficient | 0.600 |
| Weir Length | 6.00 ft |
| Weir Coefficient | 3.00 (ft^0.5)/s |
| K Reverse | 1.000 |
| Manning's n | 0.000 |
| Kev, Charged Riser | 0.000 |
| Weir Submergence | False |
| Orifice H to crest | False |

| Structure ID: TW<br>Structure Type: TW Setup, DS Channel | |
|---|---|
| Tailwater Type | Free Outfall |

| Convergence Tolerances | |
|---|---|
| Maximum Iterations | 30 |
| Tailwater Tolerance (Minimum) | 0.01 ft |
| Tailwater Tolerance (Maximum) | 0.50 ft |
| Headwater Tolerance (Minimum) | 0.01 ft |
| Headwater Tolerance (Maximum) | 0.50 ft |
| Flow Tolerance (Minimum) | 0.001 ft³/s |
| Flow Tolerance (Maximum) | 10.000 ft³/s |

Subsection: Individual Outlet Curves
Label: POND 2D OUT

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Area)
---
Upstream ID = (Pond Water Surface)
Downstream ID = Culvert - 1 (Culvert-Circular)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6,891.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,891.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.50 | 0.00 | 6,892.50 | Free Outfall | 6,892.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.00 | 0.00 | 6,893.00 | Free Outfall | 6,892.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.50 | 0.00 | 6,893.50 | Free Outfall | 6,892.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.00 | 0.00 | 6,894.00 | Free Outfall | 6,892.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.50 | 0.00 | 6,894.50 | Free Outfall | 6,892.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.00 | 0.00 | 6,895.00 | Free Outfall | 6,892.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.50 | 0.00 | 6,895.50 | 6,892.81 | 6,892.81 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,896.00 | 0.00 | 6,896.00 | 6,893.39 | 6,893.39 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,896.50 | 0.00 | 6,896.50 | 6,893.92 | 6,893.92 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,897.00 | 0.00 | 6,897.00 | 6,894.41 | 6,894.41 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,897.40 | 0.00 | 6,897.40 | 6,894.80 | 6,894.80 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,897.50 | 0.00 | 6,897.50 | 6,894.92 | 6,894.92 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,898.00 | 0.00 | 6,898.00 | 6,895.64 | 6,895.64 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,898.50 | 0.00 | 6,898.50 | 6,896.46 | 6,896.46 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,899.00 | 0.00 | 6,899.00 | 6,897.37 | 6,897.37 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,899.50 | 0.00 | 6,899.50 | 6,898.23 | 6,898.23 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,900.00 | 0.00 | 6,900.00 | 6,899.37 | 6,899.37 | 0.00 | 0.00 | (N/A) | 0.00 |

| |
|---|
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| Hi=.50; Ht=.00; Qt=.00 |
| Hi=1.00; Ht=.00; Qt=.00 |
| Hi=1.50; Ht=.00; Qt=.00 |
| Hi=2.00; Ht=.00; Qt=.00 |
| Hi=2.50; Ht=.00; Qt=.00 |
| Hi=3.00; Ht=.00; Qt=.00 |
| Hi=2.69; Ht=.00; Qt=.00 |
| Hi=2.61; Ht=.00; Qt=.00 |
| Hi=2.58; Ht=.00; Qt=.00 |
| Hi=2.59; Ht=.00; Qt=.00 |
| Hi=2.60; Ht=.00; Qt=.00 |
| Hi=2.58; Ht=.00; Qt=.00 |
| H =.00 |

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Area)
---
Upstream ID = (Pond Water Surface)
Downstream ID = Culvert - 1 (Culvert-Circular)

| Message |
|---|
| H =.00 |
| H =.00 |
| H =.00 |
| H =.00 |

Subsection: Individual Outlet Curves
Label: POND 2D OUT

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Riser - 1 (Inlet Box)

Upstream ID = (Pond Water Surface)
Downstream ID = Culvert - 1 (Culvert-Circular)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6,891.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,891.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.50 | 0.00 | 0.00 | 0.00 | 6,892.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.00 | 0.00 | 0.00 | 0.00 | 6,892.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.50 | 0.00 | 0.00 | 0.00 | 6,892.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.00 | 0.00 | 0.00 | 0.00 | 6,892.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.50 | 0.00 | 0.00 | 0.00 | 6,892.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.00 | 0.00 | 0.00 | 0.00 | 6,892.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.50 | 4.24 | 6,895.50 | Free Outfall | 6,892.81 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,896.00 | 12.00 | 6,896.00 | Free Outfall | 6,893.39 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,896.50 | 22.05 | 6,896.50 | Free Outfall | 6,893.92 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,897.00 | 33.94 | 6,897.00 | Free Outfall | 6,894.41 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,897.40 | 44.62 | 6,897.40 | Free Outfall | 6,894.80 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,897.50 | 47.43 | 6,897.50 | Free Outfall | 6,894.92 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,898.00 | 62.35 | 6,898.00 | 6,895.64 | 6,895.64 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,898.50 | 78.57 | 6,898.50 | 6,896.46 | 6,896.46 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,899.00 | 96.00 | 6,899.00 | 6,897.37 | 6,897.37 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,899.50 | 104.24 | 6,899.50 | 6,898.23 | 6,898.23 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,900.00 | 109.88 | 6,900.00 | 6,899.37 | 6,899.37 | 0.00 | 0.00 | (N/A) | 0.00 |

| |
|---|
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| W5 below an invert; no flow. |
| W5 below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| Weir: H =0.5ft |
| Weir: H =1ft |
| Weir: H =1.5ft |
| Weir: H =2ft |
| Weir: H =2.4ft |
| Weir: H =2.5ft |

Subsection: Individual Outlet Curves
Label: POND 2D OUT

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Riser - 1 (Inlet Box)

Upstream ID = (Pond Water Surface)
Downstream ID = Culvert - 1 (Culvert-Circular)

| Possible |
| --- |
| FULLY CHARGED RISER: ADJUSTED TO WEIR: H =3ft |
| FULLY CHARGED RISER: ADJUSTED TO WEIR: H =3.5ft |
| FULLY CHARGED RISER: ADJUSTED TO WEIR: H =4ft |
| FULLY CHARGED RISER: Orifice Equation Control to Crest; H=4.50 |
| FULLY CHARGED RISER: Orifice Equation Control to Crest; H=5.00 |

Subsection: Individual Outlet Curves
Label: POND 2D OUT

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Culvert - 1 (Culvert-Circular)

Mannings open channel maximum capacity: 299.14 ft³/s
Upstream ID = Orifice - 1, Riser - 2, Riser - 1
Downstream ID = Tailwater (Pond Outfall)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6,891.00 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,891.50 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.00 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.50 | 0.00 | 6,892.00 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.00 | 0.00 | 6,892.00 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.50 | 0.00 | 6,892.00 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.00 | 0.00 | 6,892.00 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.50 | 0.00 | 6,892.00 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.00 | 0.00 | 6,892.00 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.50 | 4.24 | 6,892.81 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,896.00 | 12.00 | 6,893.39 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,896.50 | 22.04 | 6,893.92 | Free Outfall | Free Outfall | 0.00 | 0.01 | (N/A) | 0.00 |
| 6,897.00 | 33.95 | 6,894.41 | Free Outfall | Free Outfall | 0.00 | 0.01 | (N/A) | 0.00 |
| 6,897.40 | 44.60 | 6,894.80 | Free Outfall | Free Outfall | 0.00 | 0.02 | (N/A) | 0.00 |
| 6,897.50 | 48.00 | 6,894.92 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,898.00 | 70.71 | 6,895.64 | Free Outfall | Free Outfall | 0.00 | 0.01 | (N/A) | 0.00 |
| 6,898.50 | 99.37 | 6,896.46 | Free Outfall | Free Outfall | 0.00 | 0.03 | (N/A) | 0.00 |
| 6,899.00 | 132.42 | 6,897.37 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,899.50 | 159.03 | 6,898.23 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,900.00 | 185.35 | 6,899.37 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |

| |
|---|
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE |
| FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE |
| FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE |
| FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE |

Subsection: Individual Outlet Curves
Label: POND 2D OUT

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Culvert - 1 (Culvert-Circular)

---

Mannings open channel maximum capacity: 299.14 ft³/s
Upstream ID = Orifice - 1, Riser - 2, Riser - 1
Downstream ID = Tailwater (Pond Outfall)

| [illegible] |
| --- |
| FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE |
| FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE |
| CRIT.DEPTH CONTROL Vh= .198ft Dcr= .577ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .344ft Dcr= .979ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .481ft Dcr= 1.337ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .619ft Dcr= 1.672ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .730ft Dcr= 1.927ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .765ft Dcr= 2.003ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .989ft Dcr= 2.453ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= 1.277ft Dcr= 2.929ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= 1.653ft Dcr= 3.386ft CRIT.DEPTH Hev= .00ft |
| INLET CONTROL... Submerged: HW =6.23 |
| INLET CONTROL... Submerged: HW =7.37 |

Subsection: Individual Outlet Curves
Label: POND 2D OUT

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Riser - 2 (Inlet Box)

Upstream ID = (Pond Water Surface)
Downstream ID = Culvert - 1 (Culvert-Circular)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6,891.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,891.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.50 | 0.00 | 0.00 | 0.00 | 6,892.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.00 | 0.00 | 0.00 | 0.00 | 6,892.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.50 | 0.00 | 0.00 | 0.00 | 6,892.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.00 | 0.00 | 0.00 | 0.00 | 6,892.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.50 | 0.00 | 0.00 | 0.00 | 6,892.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.00 | 0.00 | 0.00 | 0.00 | 6,892.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.50 | 0.00 | 0.00 | 0.00 | 6,892.81 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,896.00 | 0.00 | 0.00 | 0.00 | 6,893.39 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,896.50 | 0.00 | 0.00 | 0.00 | 6,893.92 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,897.00 | 0.00 | 0.00 | 0.00 | 6,894.41 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,897.40 | 0.00 | 0.00 | 0.00 | 6,894.80 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,897.50 | 0.57 | 6,897.50 | Free Outfall | 6,894.92 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,898.00 | 8.37 | 6,898.00 | Free Outfall | 6,895.64 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,898.50 | 20.77 | 6,898.50 | Free Outfall | 6,896.46 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,899.00 | 36.43 | 6,899.00 | Free Outfall | 6,897.37 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,899.50 | 54.78 | 6,899.50 | 6,898.23 | 6,898.23 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,900.00 | 75.46 | 6,900.00 | 6,899.37 | 6,899.37 | 0.00 | 0.00 | (N/A) | 0.00 |

| |
|---|
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| Weir: H =0.1ft |
| Weir: H =0.6ft |

Subsection: Individual Outlet Curves
Label: POND 2D OUT

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

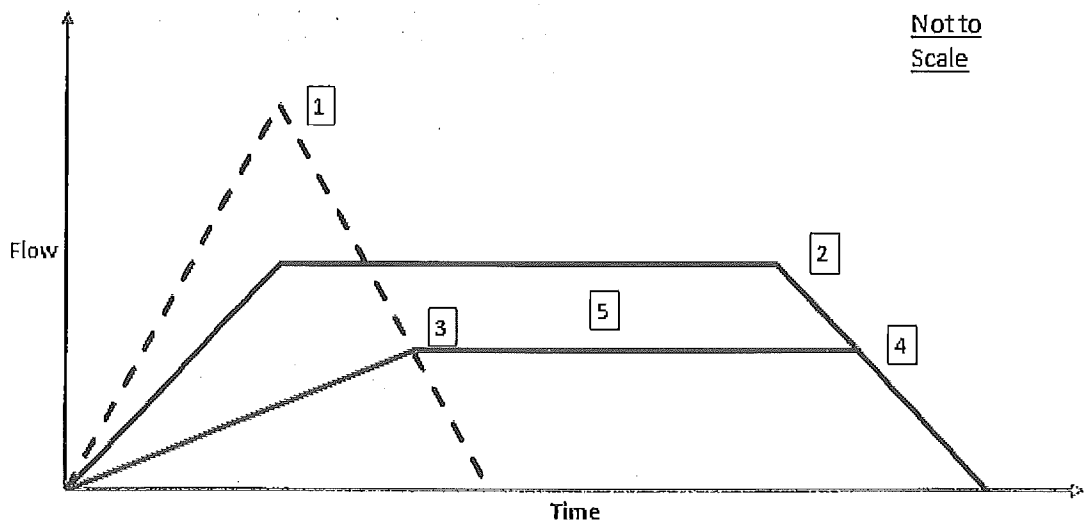
RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Riser - 2 (Inlet Box)
---
Upstream ID = (Pond Water Surface)
Downstream ID = Culvert - 1 (Culvert-Circular)

| Condition |
|---|
| Weir: H =1.1ft |
| Weir: H =1.6ft |
| FULLY CHARGED RISER: ADJUSTED TO WEIR: H =2.1ft |
| FULLY CHARGED RISER: ADJUSTED TO WEIR: H =2.6ft |

Subsection: Modified Rational Graph
Label: BASIN B12-B14

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

| Method Type | Method T |
|---|---|
| Time of Duration (Modified Rational, Critical) | 0.383 hours |




| [1] | | | [2] | | |
|---|---|---|---|---|---|
| Time of Concentration (Modified Rational, Composite) | 0.250 | hours | Time of Duration (Modified Rational, Critical) | 0.383 | hours |
| Intensity (Modified Rational, Peak) | 3.460 | in/h | Intensity (Modified Rational, Critical) | 2.812 | in/h |
| Flow (Modified Rational, Peak) | 27.87 | ft³/s | Flow (Modified Rational, Critical) | 22.65 | ft³/s |

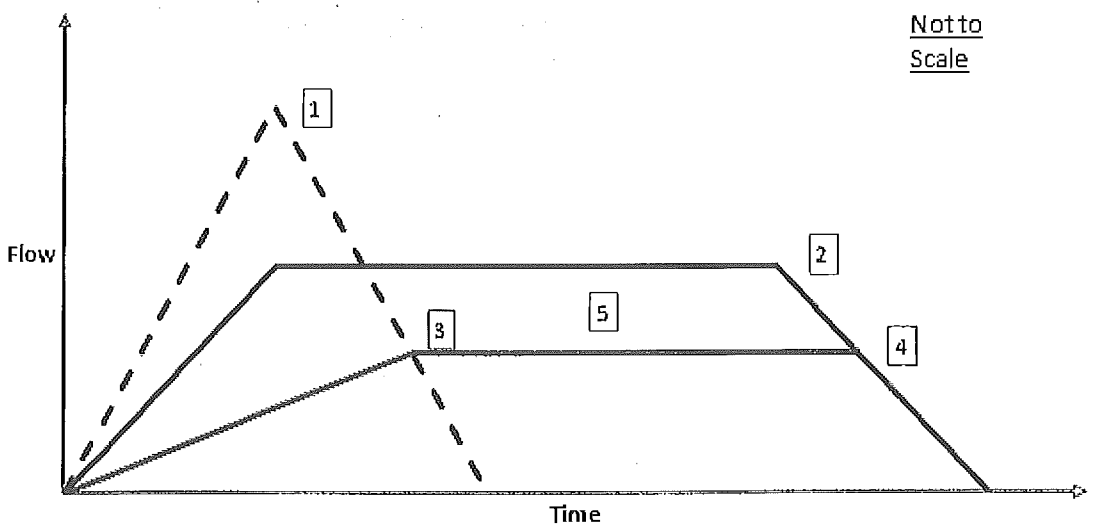
| [3] | |
|---|---|
| First Outflow Breakpoint (Modified Rational, Method T) | 0.509 hours |
| Flow (Modified Rational, Allowable) | 11.29 ft³/s |

| [4] | | | [5] | | |
|---|---|---|---|---|---|
| Second Outflow Breakpoint (Modified Rational) | 0.399 | hours | Storage (Modified Rational, Estimated) | 0.371 | ac-ft |
| Flow (Modified Rational, Allowable) | 11.29 | ft³/s | | | |

Subsection: Modified Rational Graph
Label: BASIN B16-B21

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

| Method Type | Method T |
|---|---|
| Time of Duration (Modified Rational, Critical) | 0.333 hours |




| [1] | | | [2] | | |
|---|---|---|---|---|---|
| Time of Concentration (Modified Rational, Composite) | 0.282 | hours | Time of Duration (Modified Rational, Critical) | 0.333 | hours |
| Intensity (Modified Rational, Peak) | 3.289 | in/h | Intensity (Modified Rational, Critical) | 3.010 | in/h |
| Flow (Modified Rational, Peak) | 81.06 | ft³/s | Flow (Modified Rational, Critical) | 74.18 | ft³/s |

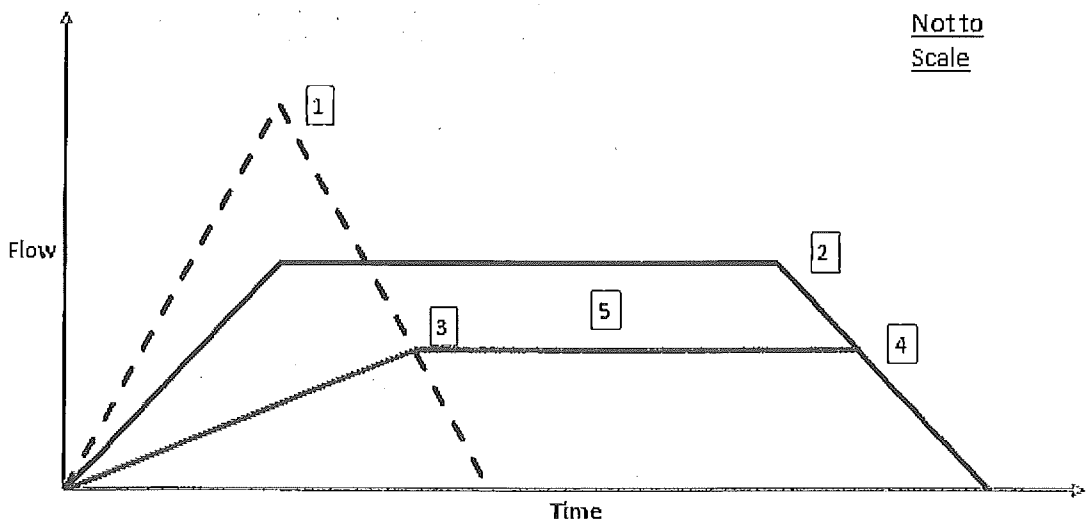
| [3] | |
|---|---|
| First Outflow Breakpoint (Modified Rational, Method T) | 0.378 hours |
| Flow (Modified Rational, Allowable) | 62.47 ft³/s |

| [4] | | | [5] | | |
|---|---|---|---|---|---|
| Second Outflow Breakpoint (Modified Rational) | 0.346 | hours | Storage (Modified Rational, Estimated) | 0.375 | ac-ft |
| Flow (Modified Rational, Allowable) | 62.47 | ft³/s | | | |

Subsection: Modified Rational Graph
Label: BASIN B1-B8

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

| Method Type | Method T |
|---|---|
| Time of Duration (Modified Rational, Critical) | 0.500 hours |




| [1] | | | [2] | | |
|---|---|---|---|---|---|
| Time of Concentration (Modified Rational, Composite) | 0.363 | hours | Time of Duration (Modified Rational, Critical) | 0.500 | hours |
| Intensity (Modified Rational, Peak) | 2.893 | in/h | Intensity (Modified Rational, Critical) | 2.420 | in/h |
| Flow (Modified Rational, Peak) | 95.93 | ft³/s | Flow (Modified Rational, Critical) | 80.26 | ft³/s |

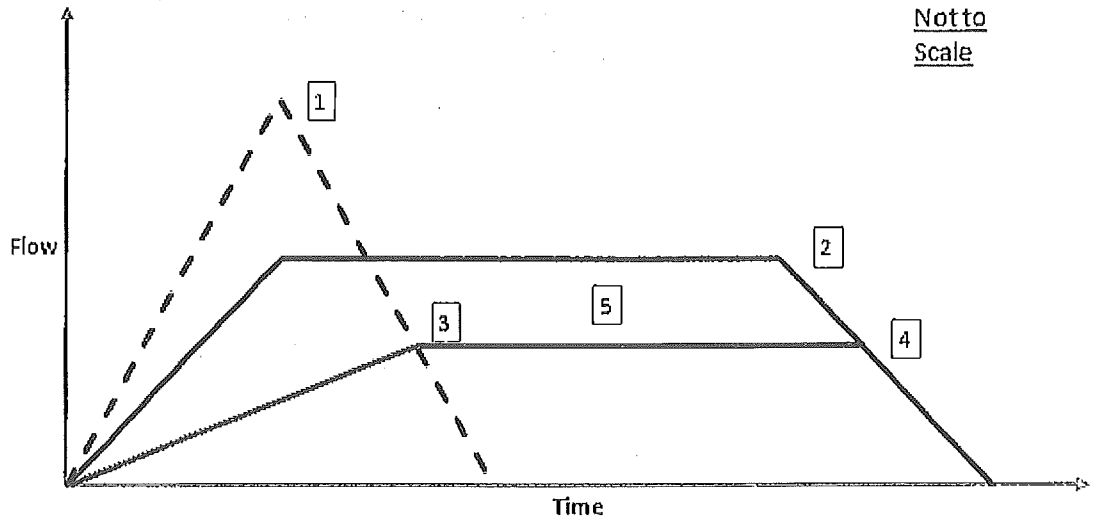
| [3] | |
|---|---|
| First Outflow Breakpoint (Modified Rational, Method T) | 0.544 hours |
| Flow (Modified Rational, Allowable) | 70.44 ft³/s |

| [4] | | | [5] | | |
|---|---|---|---|---|---|
| Second Outflow Breakpoint (Modified Rational) | 0.459 | hours | Storage (Modified Rational, Estimated) | 0.557 | ac-ft |
| Flow (Modified Rational, Allowable) | 70.44 | ft³/s | | | |

Subsection: Modified Rational Graph
Label: BASIN B-22-OS-8

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

| Method Type | Method T |
|---|---|
| Time of Duration (Modified Rational, Critical) | 0.467 hours |




| [1] | | | [2] | | |
|---|---|---|---|---|---|
| Time of Concentration (Modified Rational, Composite) | 0.210 | hours | Time of Duration (Modified Rational, Critical) | 0.467 | hours |
| Intensity (Modified Rational, Peak) | 3.767 | in/h | Intensity (Modified Rational, Critical) | 2.524 | in/h |
| Flow (Modified Rational, Peak) | 39.43 | ft³/s | Flow (Modified Rational, Critical) | 26.42 | ft³/s |

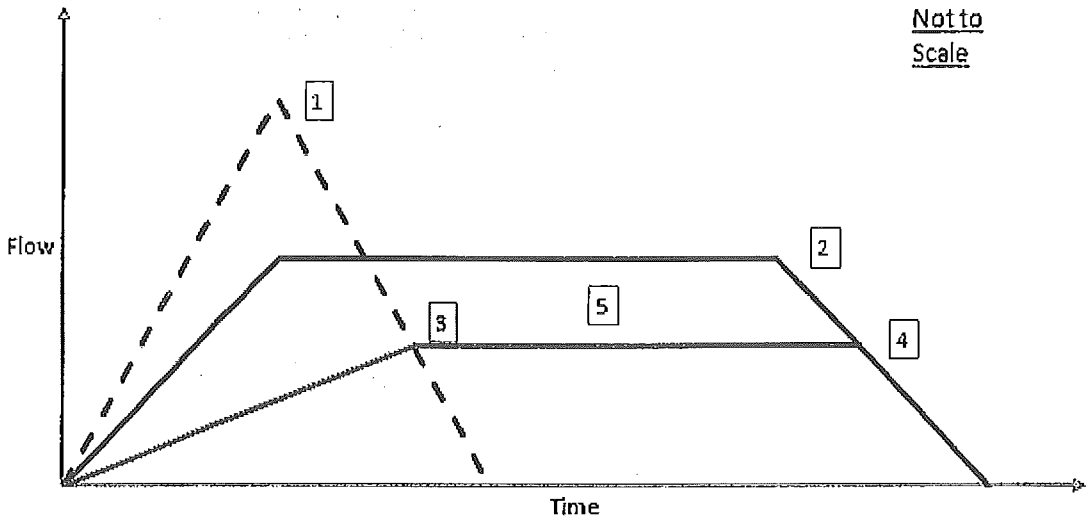
| [3] | |
|---|---|
| First Outflow Breakpoint (Modified Rational, Method T) | 0.584 hours |
| Flow (Modified Rational, Allowable) | 11.65 ft³/s |

| [4] | | | [5] | | |
|---|---|---|---|---|---|
| Second Outflow Breakpoint (Modified Rational) | 0.358 | hours | Storage (Modified Rational, Estimated) | 0.584 | ac-ft |
| Flow (Modified Rational, Allowable) | 11.65 | ft³/s | | | |

Subsection: Modified Rational Graph
Label: BASIN B9-B11

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

| Method Type | Method T |
|---|---|
| Time of Duration (Modified Rational, Critical) | 0.383 hours |




| [1] | | | [2] | | |
|---|---|---|---|---|---|
| Time of Concentration (Modified Rational, Composite) | 0.238 | hours | Time of Duration (Modified Rational, Critical) | 0.383 | hours |
| Intensity (Modified Rational, Peak) | 3.550 | in/h | Intensity (Modified Rational, Critical) | 2.812 | in/h |
| Flow (Modified Rational, Peak) | 29.45 | ft³/s | Flow (Modified Rational, Critical) | 23.33 | ft³/s |

| [3] | |
|---|---|
| First Outflow Breakpoint (Modified Rational, Method T) | 0.505 hours |
| Flow (Modified Rational, Allowable) | 11.43 ft³/s |

| [4] | | | [5] | | |
|---|---|---|---|---|---|
| Second Outflow Breakpoint (Modified Rational) | 0.384 | hours | Storage (Modified Rational, Estimated) | 0.388 | ac-ft |
| Flow (Modified Rational, Allowable) | 11.43 | ft³/s | | | |

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| Project Summary | |
|---|---|
| Title | POND 2A, 2B, 2C, 100 YEAR EVENT |
| Engineer | |
| Company | |
| Date | 8/15/2012 |

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Subsection: Modified Rational Grand Summary

## Modified Rational Method

### Q = CiA * Units Conversion; Where conversion = 43560 / (12 * 3600)

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|---|---|---|
| 100 | 67.400 | 0.588 | 0.500 | 4.310 | 172.23 | 125.34 | 7.117 | 2.161 |
| 100 | 16.100 | 0.611 | 0.467 | 4.494 | 44.58 | 20.34 | 1.719 | 0.961 |
| 100 | 15.900 | 0.603 | 0.467 | 4.494 | 43.41 | 20.09 | 1.674 | 0.925 |
| 100 | 44.100 | 0.654 | 0.333 | 5.360 | 155.93 | 111.15 | 4.295 | 1.312 |
| 100 | 16.400 | 0.714 | 0.550 | 4.088 | 48.25 | 20.73 | 2.193 | 1.281 |

Subsection: Master Network Summary

## Catchments Summary

| [illegible] | [illegible] | [illegible] (year) | [illegible] (cfs) | [illegible] (hr) | [illegible] |
|---|---|---|---|---|---|
| BASIN B-22-OS-8 | Post-Development 100 year | 100 | 2.193 | 0.250 | 48.25 |
| BASIN B1-B8 | Post-Development 100 year | 100 | 7.117 | 0.400 | 172.23 |
| BASIN B12-B14 | Post-Development 100 year | 100 | 1.674 | 0.250 | 43.41 |
| BASIN B16-B21 | Post-Development 100 year | 100 | 4.281 | 0.300 | 155.93 |
| BASIN B9-B11 | Post-Development 100 year | 100 | 1.713 | 0.250 | 44.58 |

## Node Summary

| [illegible] | [illegible] | [illegible] (year) | [illegible] (cfs) | [illegible] (hr) | [illegible] |
|---|---|---|---|---|---|
| RELEASE | Post-Development 100 year | 100 | 16.890 | 0.550 | 147.72 |

## Pond Summary

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|---|---|
| POND 2A (IN) | Post-Development 100 year | 100 | 7.117 | 0.400 | 172.23 | (N/A) | (N/A) |
| POND 2A (OUT) | Post-Development 100 year | 100 | 7.066 | 0.700 | 69.50 | 6,939.03 | 4.271 |
| POND 2B (IN) | Post-Development 100 year | 100 | 8.779 | 0.450 | 102.95 | (N/A) | (N/A) |
| POND 2B (OUT) | Post-Development 100 year | 100 | 8.743 | 1.300 | 47.15 | 6,925.48 | 3.334 |
| POND 2C (IN) | Post-Development 100 year | 100 | 16.892 | 0.300 | 272.53 | (N/A) | (N/A) |
| POND 2C (OUT) | Post-Development 100 year | 100 | 16.890 | 0.550 | 147.72 | 6,899.22 | 5.851 |

Subsection: I-D-F Table
Label: CO SPRINGS

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

**I-D-F Curve**

| [illegible] | [illegible] |
|---|---|
| 0.083 | 9.070 |
| 0.167 | 7.290 |
| 0.250 | 6.160 |
| 0.333 | 5.360 |
| 0.417 | 4.770 |
| 0.500 | 4.310 |
| 0.583 | 3.940 |
| 0.667 | 3.630 |
| 0.750 | 3.380 |
| 0.833 | 3.160 |
| 0.917 | 2.980 |
| 1.000 | 2.810 |

Subsection: Elevation-Area Volume Curve
Label: POND 2A

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|
| 6,930.00 | 0.0 | 0.010 | 0.000 | 0.000 | 0.000 |
| 6,932.00 | 0.0 | 0.320 | 0.387 | 0.258 | 0.258 |
| 6,934.00 | 0.0 | 0.460 | 1.164 | 0.776 | 1.033 |
| 6,936.00 | 0.0 | 0.610 | 1.600 | 1.066 | 2.100 |
| 6,938.00 | 0.0 | 0.750 | 2.036 | 1.358 | 3.458 |
| 6,940.00 | 0.0 | 0.910 | 2.486 | 1.657 | 5.115 |

Subsection: Elevation-Area Volume Curve
Label: POND 2B

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|
| 6,916.00 | 0.0 | 0.010 | 0.000 | 0.000 | 0.000 |
| 6,918.00 | 0.0 | 0.190 | 0.244 | 0.162 | 0.162 |
| 6,920.00 | 0.0 | 0.330 | 0.770 | 0.514 | 0.676 |
| 6,922.00 | 0.0 | 0.440 | 1.151 | 0.767 | 1.443 |
| 6,924.00 | 0.0 | 0.560 | 1.496 | 0.998 | 2.441 |
| 6,926.00 | 0.0 | 0.680 | 1.857 | 1.238 | 3.679 |

Subsection: Elevation-Area Volume Curve
Label: POND 2C

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

| Elevation (ft) | Perimeter (ft) | Area (acres) | Area Sum (acres) | Volume (acre-ft) | Volume (Total) (acre-ft) |
|---|---|---|---|---|---|
| 6,892.00 | 0.0 | 0.070 | 0.000 | 0.000 | 0.000 |
| 6,894.00 | 0.0 | 0.720 | 1.014 | 0.676 | 0.676 |
| 6,896.00 | 0.0 | 0.930 | 2.468 | 1.646 | 2.322 |
| 6,898.00 | 0.0 | 1.150 | 3.114 | 2.076 | 4.398 |
| 6,900.00 | 0.0 | 1.270 | 3.629 | 2.419 | 6.817 |

| Requested Pond Water Surface Elevations | |
|---|---|
| Minimum (Headwater) | 6,930.00 ft |
| Increment (Headwater) | 0.50 ft |
| Maximum (Headwater) | 6,940.00 ft |

## Outlet Connectivity

| [illegible] | [illegible] | [illegible] | Outfall | [illegible] | [illegible] |
|---|---|---|---|---|---|
| Culvert-Circular<br>Tailwater Settings | Culvert - 1<br>Tailwater | Forward | TW | 6,931.00<br>(N/A) | 6,940.00<br>(N/A) |

| Structure ID: Culvert - 1<br>Structure Type: Culvert-Circular | |
|---|---|
| Number of Barrels | 1 |
| Diameter | 30.0 in |
| Length | 50.00 ft |
| Length (Computed Barrel) | 50.04 ft |
| Slope (Computed) | 0.040 ft/ft |

| Outlet Control Data | |
|---|---|
| Manning's n | 0.013 |
| Ke | 0.200 |
| Kb | 0.009 |
| Kr | 0.000 |
| Convergence Tolerance | 0.00 ft |

| Inlet Control Data | |
|---|---|
| Equation Form | Form 1 |
| K | 0.0045 |
| M | 2.0000 |
| C | 0.0317 |
| Y | 0.6900 |
| T1 ratio (HW/D) | 1.075 |
| T2 ratio (HW/D) | 1.177 |
| Slope Correction Factor | -0.500 |

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

| | | | |
|---|---|---|---|
| T1 Elevation | 6,933.69 ft | T1 Flow | 27.16 ft³/s |
| T2 Elevation | 6,933.94 ft | T2 Flow | 31.05 ft³/s |

Structure ID: TW
Structure Type: TW Setup, DS Channel

| Tailwater Type | Free Outfall |
|---|---|
| **Convergence Tolerances** | |
| Maximum Iterations | 30 |
| Tailwater Tolerance (Minimum) | 0.01 ft |
| Tailwater Tolerance (Maximum) | 0.50 ft |
| Headwater Tolerance (Minimum) | 0.01 ft |
| Headwater Tolerance (Maximum) | 0.50 ft |
| Flow Tolerance (Minimum) | 0.001 $ft^3/s$ |
| Flow Tolerance (Maximum) | 10.000 $ft^3/s$ |

Subsection: Individual Outlet Curves
Label: POND 2A OUT

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Culvert - 1 (Culvert-Circular)

---

Mannings open channel maximum capacity: 88.24 ft³/s
Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

| Water Surface Elevation (ft) | Flow (ft³/s) | Tailwater Elevation (ft) | Convergence Error (ft) |
|---|---|---|---|
| 6,930.00 | 0.00 | (N/A) | 0.00 |
| 6,930.50 | 0.00 | (N/A) | 0.00 |
| 6,931.00 | 0.00 | (N/A) | 0.00 |
| 6,931.50 | 1.19 | (N/A) | 0.00 |
| 6,932.00 | 4.51 | (N/A) | 0.00 |
| 6,932.50 | 9.58 | (N/A) | 0.00 |
| 6,933.00 | 15.97 | (N/A) | 0.00 |
| 6,933.50 | 23.17 | (N/A) | 0.00 |
| 6,934.00 | 30.71 | (N/A) | 0.00 |
| 6,934.50 | 37.24 | (N/A) | 0.00 |
| 6,935.00 | 42.03 | (N/A) | 0.00 |
| 6,935.50 | 46.34 | (N/A) | 0.00 |
| 6,936.00 | 50.27 | (N/A) | 0.00 |
| 6,936.50 | 53.92 | (N/A) | 0.00 |
| 6,937.00 | 57.34 | (N/A) | 0.00 |
| 6,937.50 | 60.56 | (N/A) | 0.00 |
| 6,938.00 | 63.62 | (N/A) | 0.00 |
| 6,938.50 | 66.54 | (N/A) | 0.00 |
| 6,939.00 | 69.34 | (N/A) | 0.00 |
| 6,939.50 | 72.03 | (N/A) | 0.00 |
| 6,940.00 | 74.61 | (N/A) | 0.00 |

| |
|---|
| Upstream HW & DNstream TW < Inv.El |
| Upstream HW & DNstream TW < Inv.El |
| Upstream HW & DNstream TW < Inv.El |
| CRIT.DEPTH CONTROL Vh= .122ft Dcr= .354ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .250ft Dcr= .700ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .389ft Dcr= 1.033ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .542ft Dcr= 1.350ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .717ft Dcr= 1.639ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .926ft Dcr= 1.889ft CRIT.DEPTH Hev= .00ft |
| INLET CONTROL... Submerged: HW =3.50 |

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Culvert - 1 (Culvert-Circular)

Mannings open channel maximum capacity: 88.24 $ft^3/s$
Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

| [illegible] |
|---|
| INLET CONTROL... Submerged: HW =4.00 |
| INLET CONTROL... Submerged: HW =4.50 |
| INLET CONTROL... Submerged: HW =5.00 |
| INLET CONTROL... Submerged: HW =5.50 |
| INLET CONTROL... Submerged: HW =6.00 |
| INLET CONTROL... Submerged: HW =6.50 |
| INLET CONTROL... Submerged: HW =7.00 |
| INLET CONTROL... Submerged: HW =7.50 |
| INLET CONTROL... Submerged: HW =8.00 |
| INLET CONTROL... Submerged: HW =8.50 |
| INLET CONTROL... Submerged: HW =9.00 |

| Requested Pond Water Surface Elevations | |
|---|---|
| Minimum (Headwater) | 6,916.00 ft |
| Increment (Headwater) | 0.50 ft |
| Maximum (Headwater) | 6,926.00 ft |

## Outlet Connectivity

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] (ft) | [illegible] (ft) |
|---|---|---|---|---|---|
| Culvert-Circular<br>Tailwater Settings | Culvert - 1<br>Tailwater | Forward | TW | 6,917.00<br>(N/A) | 6,926.00<br>(N/A) |

| Structure ID: Culvert - 1<br>Structure Type: Culvert-Circular | |
|---|---|
| Number of Barrels | 1 |
| Diameter | 24.0 in |
| Length | 50.00 ft |
| Length (Computed Barrel) | 50.04 ft |
| Slope (Computed) | 0.040 ft/ft |

| Outlet Control Data | |
|---|---|
| Manning's n | 0.013 |
| Ke | 0.200 |
| Kb | 0.012 |
| Kr | 0.000 |
| Convergence Tolerance | 0.00 ft |

| Inlet Control Data | |
|---|---|
| Equation Form | Form 1 |
| K | 0.0045 |
| M | 2.0000 |
| C | 0.0317 |
| Y | 0.6900 |
| T1 ratio (HW/D) | 1.075 |
| T2 ratio (HW/D) | 1.177 |
| Slope Correction Factor | -0.500 |

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

| | | | |
|---|---|---|---|
| T1 Elevation | 6,919.15 ft | T1 Flow | 15.55 ft³/s |
| T2 Elevation | 6,919.35 ft | T2 Flow | 17.77 ft³/s |

Structure ID: TW
Structure Type: TW Setup, DS Channel

| Tailwater Type | Free Outfall |
|---|---|
| **Convergence Tolerances** | |
| Maximum Iterations | 30 |
| Tailwater Tolerance (Minimum) | 0.01 ft |
| Tailwater Tolerance (Maximum) | 0.50 ft |
| Headwater Tolerance (Minimum) | 0.01 ft |
| Headwater Tolerance (Maximum) | 0.50 ft |
| Flow Tolerance (Minimum) | 0.001 $ft^3/s$ |
| Flow Tolerance (Maximum) | 10.000 $ft^3/s$ |

Subsection: Individual Outlet Curves
Label: POND 2B OUT

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Culvert - 1 (Culvert-Circular)
---
Mannings open channel maximum capacity: 48.67 ft³/s
Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

| W.S. Elev. (ft) | Flow (cfs) | Tailwater Elevation (ft) | Convergence Error (ft) |
|---|---|---|---|
| 6,916.00 | 0.00 | (N/A) | 0.00 |
| 6,916.50 | 0.00 | (N/A) | 0.00 |
| 6,917.00 | 0.00 | (N/A) | 0.00 |
| 6,917.50 | 1.05 | (N/A) | 0.00 |
| 6,918.00 | 3.92 | (N/A) | 0.00 |
| 6,918.50 | 8.17 | (N/A) | 0.00 |
| 6,919.00 | 13.27 | (N/A) | 0.00 |
| 6,919.50 | 18.65 | (N/A) | 0.00 |
| 6,920.00 | 22.73 | (N/A) | 0.00 |
| 6,920.50 | 25.93 | (N/A) | 0.00 |
| 6,921.00 | 28.78 | (N/A) | 0.00 |
| 6,921.50 | 31.36 | (N/A) | 0.00 |
| 6,922.00 | 33.76 | (N/A) | 0.00 |
| 6,922.50 | 35.99 | (N/A) | 0.00 |
| 6,923.00 | 38.09 | (N/A) | 0.00 |
| 6,923.50 | 40.08 | (N/A) | 0.00 |
| 6,924.00 | 41.98 | (N/A) | 0.00 |
| 6,924.50 | 43.79 | (N/A) | 0.00 |
| 6,925.00 | 45.54 | (N/A) | 0.00 |
| 6,925.50 | 47.21 | (N/A) | 0.00 |
| 6,926.00 | 48.83 | (N/A) | 0.00 |

| Comments |
|---|
| Upstream HW & DNstream TW < Inv.El |
| Upstream HW & DNstream TW < Inv.El |
| Upstream HW & DNstream TW < Inv.El |
| CRIT.DEPTH CONTROL Vh= .123ft Dcr= .354ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .255ft Dcr= .695ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .402ft Dcr= 1.018ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .574ft Dcr= 1.311ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .787ft Dcr= 1.555ft CRIT.DEPTH Hev= .00ft |
| INLET CONTROL... Submerged: HW =3.00 |
| INLET CONTROL... Submerged: HW =3.50 |

Subsection: Individual Outlet Curves
Label: POND 2B OUT

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Culvert - 1 (Culvert-Circular)

---

Mannings open channel maximum capacity: 48.67 $ft^3/s$
Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

| Computation Messages |
|---|
| INLET CONTROL... Submerged: HW =4.00 |
| INLET CONTROL... Submerged: HW =4.50 |
| INLET CONTROL... Submerged: HW =5.00 |
| INLET CONTROL... Submerged: HW =5.50 |
| INLET CONTROL... Submerged: HW =6.00 |
| INLET CONTROL... Submerged: HW =6.50 |
| INLET CONTROL... Submerged: HW =7.00 |
| INLET CONTROL... Submerged: HW =7.50 |
| INLET CONTROL... Submerged: HW =8.00 |
| INLET CONTROL... Submerged: HW =8.50 |
| INLET CONTROL... Submerged: HW =9.00 |

| Requested Pond Water Surface Elevations | |
|---|---|
| Minimum (Headwater) | 6,892.00 ft |
| Increment (Headwater) | 0.50 ft |
| Maximum (Headwater) | 6,900.00 ft |

## Outlet Connectivity

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|
| Orifice-Area | Orifice - 1 | Forward | Culvert - 1 | 6,892.00 | 6,900.00 |
| Inlet Box | Riser - 2 | Forward | Culvert - 1 | 6,897.40 | 6,900.00 |
| Inlet Box | Riser - 1 | Forward | Culvert - 1 | 6,895.00 | 6,900.00 |
| Culvert-Circular | Culvert - 1 | Forward | TW | 6,892.00 | 6,900.00 |
| Tailwater Settings | Tailwater | | | (N/A) | (N/A) |

| Structure ID: Orifice - 1<br>Structure Type: Orifice-Area | |
|---|---|
| Number of Openings | 12 |
| Elevation | 6,892.00 ft |
| Orifice Area | 0.1 ft² |
| Top Elevation | 6,898.00 ft |
| Datum Elevation | 6,892.00 ft |
| Orifice Coefficient | 0.600 |

| Structure ID: Riser - 1<br>Structure Type: Inlet Box | |
|---|---|
| Number of Openings | 1 |
| Elevation | 6,895.00 ft |
| Orifice Area | 10.2 ft² |
| Orifice Coefficient | 0.600 |
| Weir Length | 4.00 ft |
| Weir Coefficient | 3.00 (ft^0.5)/s |
| K Reverse | 1.000 |
| Manning's n | 0.000 |
| Kev, Charged Riser | 0.000 |
| Weir Submergence | False |
| Orifice H to crest | False |

| Structure ID: Culvert - 1<br>Structure Type: Culvert-Circular | |
|---|---|
| Number of Barrels | 1 |
| Diameter | 54.0 in |
| Length | 100.00 ft |
| Length (Computed Barrel) | 100.02 ft |
| Slope (Computed) | 0.020 ft/ft |

| Outlet Control Data | |
|---|---|
| Manning's n | 0.013 |
| Ke | 0.200 |
| Kb | 0.004 |
| Kr | 0.000 |
| Convergence Tolerance | 0.00 ft |

| Inlet Control Data | |
|---|---|
| Equation Form | Form 1 |
| K | 0.0045 |
| M | 2.0000 |
| C | 0.0317 |
| Y | 0.6900 |
| T1 ratio (HW/D) | 1.085 |
| T2 ratio (HW/D) | 1.187 |
| Slope Correction Factor | -0.500 |

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

| | | | |
|---|---|---|---|
| T1 Elevation | 6,896.88 ft | T1 Flow | 118.08 ft³/s |
| T2 Elevation | 6,897.34 ft | T2 Flow | 134.95 ft³/s |

| Structure ID: Riser - 2<br>Structure Type: Inlet Box | |
|---|---|
| Number of Openings | 1 |
| Elevation | 6,897.40 ft |
| Orifice Area | 16.0 ft² |
| Orifice Coefficient | 0.600 |
| Weir Length | 6.00 ft |
| Weir Coefficient | 3.00 (ft^0.5)/s |
| K Reverse | 1.000 |
| Manning's n | 0.000 |
| Kev, Charged Riser | 0.000 |
| Weir Submergence | False |
| Orifice H to crest | False |

| Structure ID: TW<br>Structure Type: TW Setup, DS Channel | |
|---|---|
| Tailwater Type | Free Outfall |

| Convergence Tolerances | |
|---|---|
| Maximum Iterations | 30 |
| Tailwater Tolerance (Minimum) | 0.01 ft |
| Tailwater Tolerance (Maximum) | 0.50 ft |
| Headwater Tolerance (Minimum) | 0.01 ft |
| Headwater Tolerance (Maximum) | 0.50 ft |
| Flow Tolerance (Minimum) | 0.001 ft³/s |
| Flow Tolerance (Maximum) | 10.000 ft³/s |

Subsection: Individual Outlet Curves
Label: POND 2D OUT

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Area)
---
Upstream ID = (Pond Water Surface)
Downstream ID = Culvert - 1 (Culvert-Circular)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6,892.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.50 | 0.33 | 6,892.50 | 6,892.22 | 6,892.22 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.00 | 0.79 | 6,893.00 | 6,892.35 | 6,892.35 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.50 | 1.29 | 6,893.50 | 6,892.44 | 6,892.44 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.00 | 1.82 | 6,894.00 | 6,892.53 | 6,892.53 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.50 | 2.36 | 6,894.50 | 6,892.61 | 6,892.61 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.00 | 2.91 | 6,895.00 | 6,892.67 | 6,892.67 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.50 | 3.15 | 6,895.50 | 6,893.08 | 6,893.08 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,896.00 | 3.32 | 6,896.00 | 6,893.58 | 6,893.58 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,896.50 | 3.54 | 6,896.50 | 6,894.07 | 6,894.07 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,897.00 | 3.80 | 6,897.00 | 6,894.56 | 6,894.56 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,897.40 | 4.06 | 6,897.40 | 6,894.94 | 6,894.94 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,897.50 | 4.11 | 6,897.50 | 6,895.06 | 6,895.06 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,898.00 | 4.32 | 6,898.00 | 6,895.77 | 6,895.77 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,898.50 | 4.01 | 6,898.50 | 6,896.57 | 6,896.57 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,899.00 | 3.57 | 6,899.00 | 6,897.47 | 6,897.47 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,899.50 | 3.08 | 6,899.50 | 6,898.36 | 6,898.36 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,900.00 | 2.10 | 6,900.00 | 6,899.47 | 6,899.47 | 0.00 | 0.00 | (N/A) | 0.00 |

WS below an invert; no flow.
Hi=.28; Ht=5.78; Qt=.58
Hi=.65; Ht=5.65; Qt=.57
Hi=1.06; Ht=5.56; Qt=.57
Hi=1.47; Ht=5.47; Qt=.56
Hi=1.89; Ht=5.39; Qt=.56
Hi=2.33; Ht=5.33; Qt=.56
Hi=2.42; Ht=4.92; Qt=.53
Hi=2.42; Ht=4.42; Qt=.51
Hi=2.43; Ht=3.93; Qt=.48
Hi=2.44; Ht=3.44; Qt=.45
Hi=2.46; Ht=3.06; Qt=.42
Hi=2.44; Ht=2.94; Qt=.41
H =2.23
H =1.93
H =1.53
H =1.14
H =.53

Subsection: Individual Outlet Curves
Label: POND 2D OUT

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Riser - 1 (Inlet Box)

---

Upstream ID = (Pond Water Surface)
Downstream ID = Culvert - 1 (Culvert-Circular)

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|---|---|---|
| 6,892.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.50 | 0.00 | 0.00 | 0.00 | 6,892.22 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.00 | 0.00 | 0.00 | 0.00 | 6,892.35 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.50 | 0.00 | 0.00 | 0.00 | 6,892.44 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.00 | 0.00 | 0.00 | 0.00 | 6,892.53 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.50 | 0.00 | 0.00 | 0.00 | 6,892.61 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.00 | 0.00 | 0.00 | 0.00 | 6,892.67 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.50 | 4.24 | 6,895.50 | Free Outfall | 6,893.08 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,896.00 | 12.00 | 6,896.00 | Free Outfall | 6,893.58 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,896.50 | 22.05 | 6,896.50 | Free Outfall | 6,894.07 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,897.00 | 33.94 | 6,897.00 | Free Outfall | 6,894.56 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,897.40 | 44.62 | 6,897.40 | Free Outfall | 6,894.94 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,897.50 | 47.43 | 6,897.50 | 6,895.06 | 6,895.06 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,898.00 | 62.35 | 6,898.00 | 6,895.77 | 6,895.77 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,898.50 | 78.57 | 6,898.50 | 6,896.57 | 6,896.57 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,899.00 | 96.00 | 6,899.00 | 6,897.47 | 6,897.47 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,899.50 | 104.24 | 6,899.50 | 6,898.36 | 6,898.36 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,900.00 | 109.88 | 6,900.00 | 6,899.47 | 6,899.47 | 0.00 | 0.00 | (N/A) | 0.00 |

| [illegible] |
|---|
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| Weir: H =0.5ft |
| Weir: H =1ft |
| Weir: H =1.5ft |
| Weir: H =2ft |
| Weir: H =2.4ft |
| FULLY CHARGED RISER: ADJUSTED TO WEIR: H =2.5ft |
| FULLY CHARGED RISER: ADJUSTED TO WEIR: H =3ft |
| FULLY CHARGED RISER: ADJUSTED TO WEIR: H =3.5ft |

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Riser - 1 (Inlet Box)

---

Upstream ID = (Pond Water Surface)
Downstream ID = Culvert - 1 (Culvert-Circular)

| Message |
| --- |
| FULLY CHARGED RISER: ADJUSTED TO WEIR: H =4ft |
| FULLY CHARGED RISER: Orifice Equation Control to Crest; H=4.50 |
| FULLY CHARGED RISER: Orifice Equation Control to Crest; H=5.00 |

Subsection: Individual Outlet Curves
Label: POND 2D OUT

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Culvert - 1 (Culvert-Circular)

---

Mannings open channel maximum capacity: 299.14 ft³/s
Upstream ID = Orifice - 1, Riser - 2, Riser - 1
Downstream ID = Tailwater (Pond Outfall)

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|---|---|---|
| 6,892.00 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.50 | 0.33 | 6,892.22 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.00 | 0.80 | 6,892.35 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.50 | 1.29 | 6,892.44 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.00 | 1.82 | 6,892.53 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.50 | 2.35 | 6,892.61 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.00 | 2.91 | 6,892.67 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.50 | 7.39 | 6,893.08 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,896.00 | 15.31 | 6,893.58 | Free Outfall | Free Outfall | 0.00 | 0.01 | (N/A) | 0.00 |
| 6,896.50 | 25.58 | 6,894.07 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,897.00 | 37.74 | 6,894.56 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,897.40 | 48.66 | 6,894.94 | Free Outfall | Free Outfall | 0.00 | 0.02 | (N/A) | 0.00 |
| 6,897.50 | 52.10 | 6,895.06 | Free Outfall | Free Outfall | 0.00 | 0.02 | (N/A) | 0.00 |
| 6,898.00 | 75.01 | 6,895.77 | Free Outfall | Free Outfall | 0.00 | 0.02 | (N/A) | 0.00 |
| 6,898.50 | 103.35 | 6,896.57 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,899.00 | 135.98 | 6,897.47 | Free Outfall | Free Outfall | 0.00 | 0.01 | (N/A) | 0.00 |
| 6,899.50 | 162.27 | 6,898.36 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,900.00 | 187.59 | 6,899.47 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |

W5 below an invert; no flow.
CRIT.DEPTH CONTROL Vh= .054ft
Dcr= .160ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .084ft
Dcr= .248ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .107ft
Dcr= .316ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .127ft
Dcr= .376ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .146ft
Dcr= .428ft CRIT.DEPTH Hev= .00ft
FLOW PRECEDENCE SET TO
UPSTREAM CONTROLLING
STRUCTURE
CRIT.DEPTH CONTROL Vh= .265ft
Dcr= .764ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .393ft
Dcr= 1.109ft CRIT.DEPTH Hev= .00ft

Subsection: Individual Outlet Curves
Label: POND 2D OUT

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Culvert - 1 (Culvert-Circular)
---
Mannings open channel maximum capacity: 299.14 ft³/s
Upstream ID = Orifice - 1, Riser - 2, Riser - 1
Downstream ID = Tailwater (Pond Outfall)

| Message |
| --- |
| CRIT.DEPTH CONTROL Vh= .524ft Dcr= 1.444ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .659ft Dcr= 1.767ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .771ft Dcr= 2.017ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .806ft Dcr= 2.090ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= 1.031ft Dcr= 2.530ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= 1.319ft Dcr= 2.989ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= 1.698ft Dcr= 3.430ft CRIT.DEPTH Hev= .00ft |
| INLET CONTROL... Submerged: HW =6.36 |
| INLET CONTROL... Submerged: HW =7.47 |

Subsection: Individual Outlet Curves
Label: POND 2D OUT

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Riser - 2 (Inlet Box)
---
Upstream ID = (Pond Water Surface)
Downstream ID = Culvert - 1 (Culvert-Circular)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6,892.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.50 | 0.00 | 0.00 | 0.00 | 6,892.22 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.00 | 0.00 | 0.00 | 0.00 | 6,892.35 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.50 | 0.00 | 0.00 | 0.00 | 6,892.44 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.00 | 0.00 | 0.00 | 0.00 | 6,892.53 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.50 | 0.00 | 0.00 | 0.00 | 6,892.61 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.00 | 0.00 | 0.00 | 0.00 | 6,892.67 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.50 | 0.00 | 0.00 | 0.00 | 6,893.08 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,896.00 | 0.00 | 0.00 | 0.00 | 6,893.58 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,896.50 | 0.00 | 0.00 | 0.00 | 6,894.07 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,897.00 | 0.00 | 0.00 | 0.00 | 6,894.56 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,897.40 | 0.00 | 0.00 | 0.00 | 6,894.94 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,897.50 | 0.57 | 6,897.50 | Free Outfall | 6,895.06 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,898.00 | 8.37 | 6,898.00 | Free Outfall | 6,895.77 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,898.50 | 20.77 | 6,898.50 | Free Outfall | 6,896.57 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,899.00 | 36.43 | 6,899.00 | 6,897.47 | 6,897.47 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,899.50 | 54.78 | 6,899.50 | 6,898.36 | 6,898.36 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,900.00 | 75.46 | 6,900.00 | 6,899.47 | 6,899.47 | 0.00 | 0.00 | (N/A) | 0.00 |

| |
|---|
| WS below an Invert; no flow. |
| WS below an Invert; no flow. |
| WS below an Invert; no flow. |
| WS below an Invert; no flow. |
| WS below an Invert; no flow. |
| WS below an Invert; no flow. |
| WS below an Invert; no flow. |
| WS below an Invert; no flow. |
| WS below an Invert; no flow. |
| WS below an Invert; no flow. |
| WS below an Invert; no flow. |
| WS below an Invert; no flow. |
| Weir: H =0.1ft |
| Weir: H =0.6ft |
| Weir: H =1.1ft |
| FULLY CHARGED RISER: ADJUSTED TO WEIR: H =1.6ft |

Subsection: Individual Outlet Curves
Label: POND 2D OUT

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Riser - 2 (Inlet Box)

---

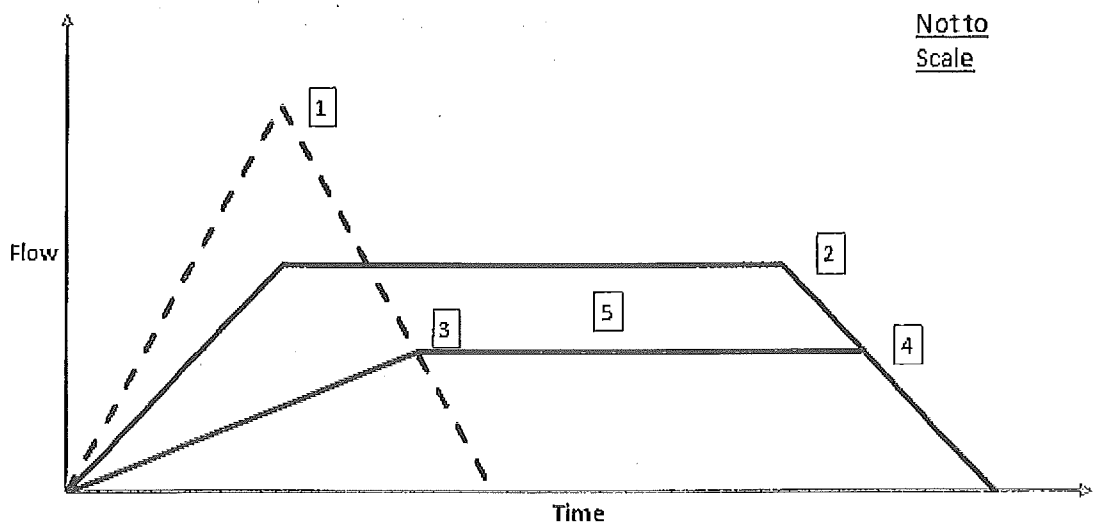
Upstream ID = (Pond Water Surface)
Downstream ID = Culvert - 1 (Culvert-Circular)

| Message |
| --- |
| FULLY CHARGED RISER: ADJUSTED TO WEIR: H =2.1ft |
| FULLY CHARGED RISER: ADJUSTED TO WEIR: H =2.6ft |

Subsection: Modified Rational Graph
Label: BASIN B12-B14

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

| Method Type | Method T |
|---|---|
| Time of Duration (Modified Rational, Critical) | 0.467 hours |




| [1] | | | [2] | | |
|---|---|---|---|---|---|
| Time of Concentration (Modified Rational, Composite) | 0.250 | hours | Time of Duration (Modified Rational, Critical) | 0.467 | hours |
| Intensity (Modified Rational, Peak) | 6.160 | in/h | Intensity (Modified Rational, Critical) | 4.494 | in/h |
| Flow (Modified Rational, Peak) | 59.50 | ft³/s | Flow (Modified Rational, Critical) | 43.41 | ft³/s |

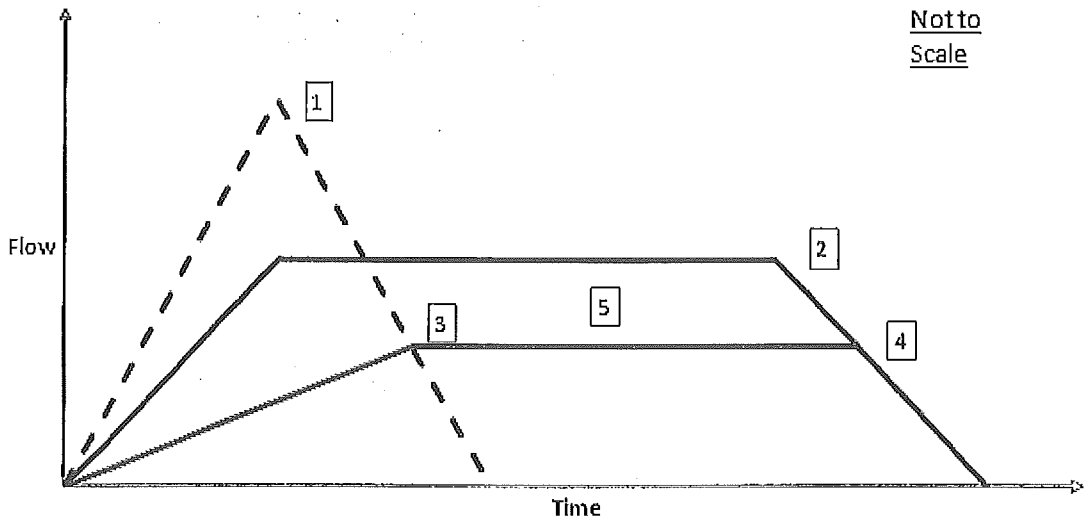
| [3] | |
|---|---|
| First Outflow Breakpoint (Modified Rational, Method T) | 0.601 hours |
| Flow (Modified Rational, Allowable) | 20.09 ft³/s |

| [4] | | | [5] | | |
|---|---|---|---|---|---|
| Second Outflow Breakpoint (Modified Rational) | 0.416 | hours | Storage (Modified Rational, Estimated) | 0.925 | ac-ft |
| Flow (Modified Rational, Allowable) | 20.09 | ft³/s | | | |

Subsection: Modified Rational Graph
Label: BASIN B16-B21

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

| Method Type | Method T |
|---|---|
| Time of Duration (Modified Rational, Critical) | 0.333 hours |




| [1] | | | [2] | | |
|---|---|---|---|---|---|
| Time of Concentration (Modified Rational, Composite) | 0.282 | hours | Time of Duration (Modified Rational, Critical) | 0.333 | hours |
| Intensity (Modified Rational, Peak) | 5.857 | in/h | Intensity (Modified Rational, Critical) | 5.360 | in/h |
| Flow (Modified Rational, Peak) | 170.37 | ft³/s | Flow (Modified Rational, Critical) | 155.93 | ft³/s |

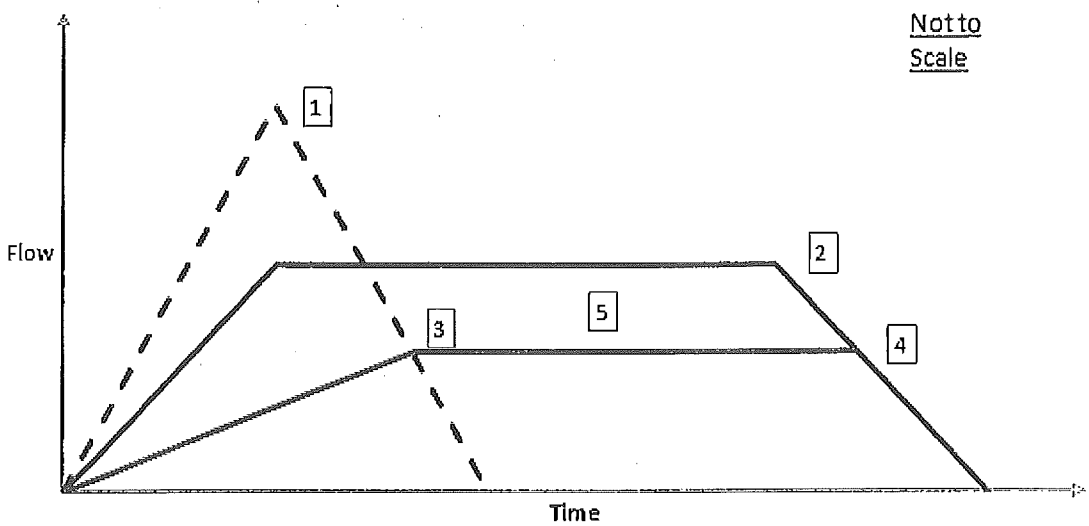
| [3] | |
|---|---|
| First Outflow Breakpoint (Modified Rational, Method T) | 0.414 hours |
| Flow (Modified Rational, Allowable) | 111.15 ft³/s |

| [4] | | | [5] | | |
|---|---|---|---|---|---|
| Second Outflow Breakpoint (Modified Rational) | 0.379 | hours | Storage (Modified Rational, Estimated) | 1.312 | ac-ft |
| Flow (Modified Rational, Allowable) | 111.15 | ft³/s | | | |

Subsection: Modified Rational Graph
Label: BASIN B1-B8

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

| Method Type | Method T |
|---|---|
| Time of Duration (Modified Rational, Critical) | 0.500 hours |




| [1] | | | [2] | | |
|---|---|---|---|---|---|
| Time of Concentration (Modified Rational, Composite) | 0.363 | hours | Time of Duration (Modified Rational, Critical) | 0.500 | hours |
| Intensity (Modified Rational, Peak) | 5.150 | in/h | Intensity (Modified Rational, Critical) | 4.310 | in/h |
| Flow (Modified Rational, Peak) | 205.80 | ft³/s | Flow (Modified Rational, Critical) | 172.23 | ft³/s |

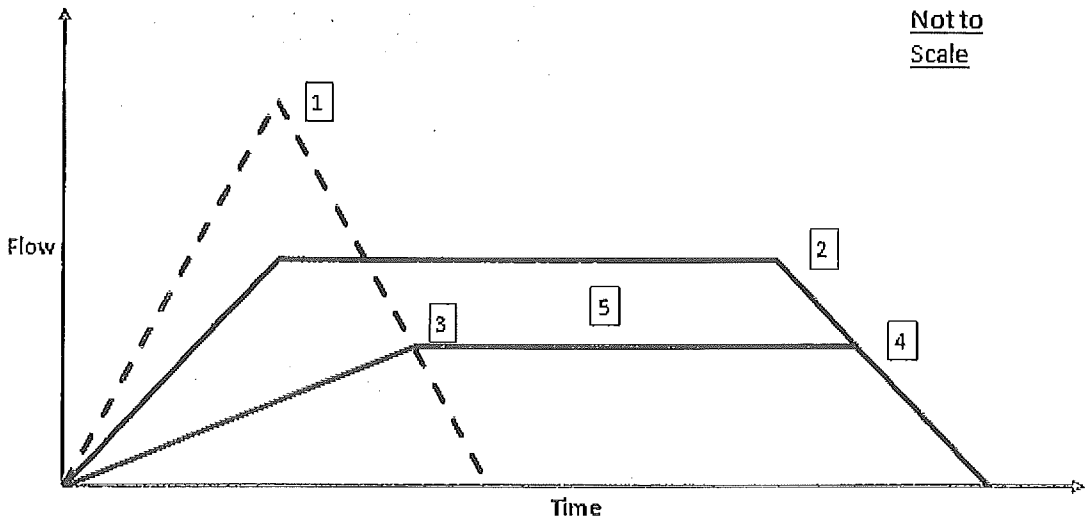
| [3] | |
|---|---|
| First Outflow Breakpoint (Modified Rational, Method T) | 0.599 hours |
| Flow (Modified Rational, Allowable) | 125.34 ft³/s |

| [4] | | | [5] | | |
|---|---|---|---|---|---|
| Second Outflow Breakpoint (Modified Rational) | 0.505 | hours | Storage (Modified Rational, Estimated) | 2.161 | ac-ft |
| Flow (Modified Rational, Allowable) | 125.34 | ft³/s | | | |

Subsection: Modified Rational Graph
Label: BASIN B-22-OS-8

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

| Method Type | Method T |
|---|---|
| Time of Duration (Modified Rational, Critical) | 0.550 hours |




| [1] | | | [2] | | |
|---|---|---|---|---|---|
| Time of Concentration (Modified Rational, Composite) | 0.210 | hours | Time of Duration (Modified Rational, Critical) | 0.550 | hours |
| Intensity (Modified Rational, Peak) | 6.702 | in/h | Intensity (Modified Rational, Critical) | 4.088 | in/h |
| Flow (Modified Rational, Peak) | 79.11 | ft³/s | Flow (Modified Rational, Critical) | 48.25 | ft³/s |

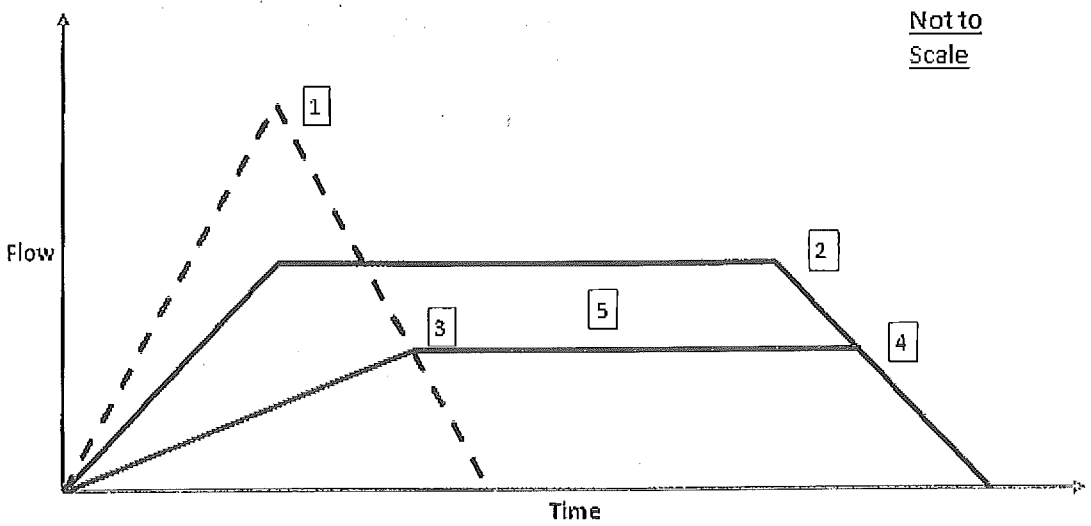
| [3] | |
|---|---|
| First Outflow Breakpoint (Modified Rational, Method T) | 0.670 hours |
| Flow (Modified Rational, Allowable) | 20.73 ft³/s |

| [4] | | | [5] | | |
|---|---|---|---|---|---|
| Second Outflow Breakpoint (Modified Rational) | 0.365 | hours | Storage (Modified Rational, Estimated) | 1.281 | ac-ft |
| Flow (Modified Rational, Allowable) | 20.73 | ft³/s | | | |

Subsection: Modified Rational Graph
Label: BASIN B9-B11

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

| Method Type | Method T |
|---|---|
| Time of Duration (Modified Rational, Critical) | 0.467 hours |




| [1] | | | [2] | | |
|---|---|---|---|---|---|
| Time of Concentration (Modified Rational, Composite) | 0.238 | hours | Time of Duration (Modified Rational, Critical) | 0.467 | hours |
| Intensity (Modified Rational, Peak) | 6.319 | in/h | Intensity (Modified Rational, Critical) | 4.494 | in/h |
| Flow (Modified Rational, Peak) | 62.69 | ft³/s | Flow (Modified Rational, Critical) | 44.58 | ft³/s |

| [3] | |
|---|---|
| First Outflow Breakpoint (Modified Rational, Method T) | 0.596 hours |
| Flow (Modified Rational, Allowable) | 20.34 ft³/s |

| [4] | | | [5] | | |
|---|---|---|---|---|---|
| Second Outflow Breakpoint (Modified Rational) | 0.399 | hours | Storage (Modified Rational, Estimated) | 0.961 | ac-ft |
| Flow (Modified Rational, Allowable) | 20.34 | ft³/s | | | |

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| Project Summary | |
|---|---|
| Title | POND-3A 5 YEAR EVENT |
| Engineer | |
| Company | |
| Date | 8/15/2012 |

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Subsection: Modified Rational Grand Summary

## Modified Rational Method

### Q = CiA * Units Conversion; Where conversion = 43560 / (12 * 3600)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5 | 18.900 | 0.550 | 0.983 | 1.598 | 16.75 | 5.89 | 1.361 | 0.896 |
| 5 | 28.800 | 0.574 | 0.717 | 1.956 | 32.61 | 13.21 | 1.931 | 1.175 |

Subsection: Master Network Summary

## Catchments Summary

| | | | | | |
|---|---|---|---|---|---|
| BASIN D1 & D6 | Post-Development 5 year | 5 | 1.361 | 0.300 | 16.75 |
| BASIN D2-D4&D7 | Post-Development 5 year | 5 | 1.931 | 0.350 | 32.61 |

## Node Summary

| | | | | | |
|---|---|---|---|---|---|
| RELEASE | Post-Development 5 year | 5 | 3.285 | 0.950 | 21.22 |

## Pond Summary

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PO-1 (IN) | Post-Development 5 year | 5 | 1.931 | 0.350 | 32.61 | (N/A) | (N/A) |
| PO-1 (OUT) | Post-Development 5 year | 5 | 1.924 | 1.000 | 4.47 | 6,891.40 | 1.712 |

Subsection: I-D-F Table
Label: CO SPRINGS

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

**I-D-F Curve**

| [illegible] (hours) | [illegible] (in/hr) |
|---|---|
| 0.083 | 5.100 |
| 0.167 | 4.100 |
| 0.250 | 3.460 |
| 0.333 | 3.010 |
| 0.417 | 2.680 |
| 0.500 | 2.420 |
| 0.583 | 2.210 |
| 0.667 | 2.040 |
| 0.750 | 1.900 |
| 0.833 | 1.780 |
| 0.917 | 1.670 |
| 1.000 | 1.580 |

Subsection: Elevation-Area Volume Curve
Label: PO-1

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

| | | | | | |
|---|---|---|---|---|---|
| 6,886.00 | 0.0 | 0.210 | 0.000 | 0.000 | 0.000 |
| 6,888.00 | 0.0 | 0.280 | 0.732 | 0.488 | 0.488 |
| 6,890.00 | 0.0 | 0.380 | 0.986 | 0.657 | 1.146 |
| 6,892.00 | 0.0 | 0.450 | 1.244 | 0.829 | 1.975 |
| 6,894.00 | 0.0 | 0.540 | 1.483 | 0.989 | 2.963 |
| 6,896.00 | 0.0 | 0.640 | 1.768 | 1.179 | 4.142 |

| Requested Pond Water Surface Elevations | |
|---|---|
| Minimum (Headwater) | 6,886.00 ft |
| Increment (Headwater) | 0.50 ft |
| Maximum (Headwater) | 6,896.00 ft |

## Outlet Connectivity

| [illegible] Type | [illegible] ID | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|
| Inlet Box | Riser - 1 | Forward | Culvert - 1 | 6,892.50 | 6,896.00 |
| Orifice-Area | Orifice - 1 | Forward | Culvert - 1 | 6,886.00 | 6,896.00 |
| Culvert-Circular | Culvert - 1 | Forward | TW | 6,886.00 | 6,896.00 |
| Tailwater Settings | Tailwater | | | (N/A) | (N/A) |

| Structure ID: Orifice - 1<br>Structure Type: Orifice-Area | |
|---|---|
| Number of Openings | 20 |
| Elevation | 6,886.00 ft |
| Orifice Area | 0.0 ft² |
| Top Elevation | 6,890.00 ft |
| Datum Elevation | 6,886.00 ft |
| Orifice Coefficient | 0.600 |

| Structure ID: Riser - 1<br>Structure Type: Inlet Box | |
|---|---|
| Number of Openings | 1 |
| Elevation | 6,892.50 ft |
| Orifice Area | 10.2 ft² |
| Orifice Coefficient | 0.600 |
| Weir Length | 4.00 ft |
| Weir Coefficient | 3.00 (ft^0.5)/s |
| K Reverse | 1.000 |
| Manning's n | 0.000 |
| Kev, Charged Riser | 0.000 |
| Weir Submergence | False |
| Orifice H to crest | False |

| Structure ID: Culvert - 1<br>Structure Type: Culvert-Circular | |
|---|---|
| Number of Barrels | 1 |
| Diameter | 36.0 in |
| Length | 100.00 ft |
| Length (Computed Barrel) | 100.00 ft |
| Slope (Computed) | 0.010 ft/ft |

| Outlet Control Data | |
|---|---|
| Manning's n | 0.013 |
| Ke | 0.200 |
| Kb | 0.007 |
| Kr | 0.000 |
| Convergence Tolerance | 0.00 ft |

| Inlet Control Data | |
|---|---|
| Equation Form | Form 1 |
| K | 0.0045 |
| M | 2.0000 |
| C | 0.0317 |

Subsection: Outlet Input Data
Label: POND 3 OUTLET

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

| Inlet Control Data | |
|---|---|
| Y | 0.6900 |
| T1 ratio (HW/D) | 1.090 |
| T2 ratio (HW/D) | 1.192 |
| Slope Correction Factor | -0.500 |

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

| | | | |
|---|---|---|---|
| T1 Elevation | 6,889.27 ft | T1 Flow | 42.85 ft³/s |
| T2 Elevation | 6,889.58 ft | T2 Flow | 48.97 ft³/s |

Structure ID: TW
Structure Type: TW Setup, DS Channel

| Tailwater Type | Free Outfall |
|---|---|
| **Convergence Tolerances** | |
| Maximum Iterations | 30 |
| Tailwater Tolerance (Minimum) | 0.01 ft |
| Tailwater Tolerance (Maximum) | 0.50 ft |
| Headwater Tolerance (Minimum) | 0.01 ft |
| Headwater Tolerance (Maximum) | 0.50 ft |
| Flow Tolerance (Minimum) | 0.001 $ft^3/s$ |
| Flow Tolerance (Maximum) | 10.000 $ft^3/s$ |

Subsection: Individual Outlet Curves
Label: POND 3 OUTLET

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Area)

Upstream ID = (Pond Water Surface)
Downstream ID = Culvert - 1 (Culvert-Circular)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6,886.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,886.50 | 0.29 | 6,886.50 | 6,886.23 | 6,886.23 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,887.00 | 0.71 | 6,887.00 | 6,886.36 | 6,886.36 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,887.50 | 1.16 | 6,887.50 | 6,886.47 | 6,886.47 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,888.00 | 1.64 | 6,888.00 | 6,886.56 | 6,886.56 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,888.50 | 2.15 | 6,888.50 | 6,886.64 | 6,886.64 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,889.00 | 2.67 | 6,889.00 | 6,886.72 | 6,886.72 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,889.50 | 3.20 | 6,889.50 | 6,886.79 | 6,886.79 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,890.00 | 3.75 | 6,890.00 | 6,886.86 | 6,886.86 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,890.50 | 4.02 | 6,890.50 | 6,886.89 | 6,886.89 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,891.00 | 4.28 | 6,891.00 | 6,886.92 | 6,886.92 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,891.50 | 4.52 | 6,891.50 | 6,886.95 | 6,886.95 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.00 | 4.75 | 6,892.00 | 6,886.97 | 6,886.97 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.50 | 4.97 | 6,892.50 | 6,886.99 | 6,886.99 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.00 | 5.02 | 6,893.00 | 6,887.38 | 6,887.38 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.50 | 5.00 | 6,893.50 | 6,887.92 | 6,887.92 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.00 | 4.97 | 6,894.00 | 6,888.50 | 6,888.50 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.50 | 4.91 | 6,894.50 | 6,889.12 | 6,889.12 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.00 | 4.83 | 6,895.00 | 6,889.79 | 6,889.79 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.50 | 4.55 | 6,895.50 | 6,890.89 | 6,890.89 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,896.00 | 4.03 | 6,896.00 | 6,892.38 | 6,892.38 | 0.00 | 0.00 | (N/A) | 0.00 |

WS below an invert; no flow.
Hi=.27; Ht=3.77; Qt=.21
Hi=.64; Ht=3.64; Qt=.20
Hi=1.03; Ht=3.53; Qt=.20
Hi=1.44; Ht=3.44; Qt=.20
Hi=1.86; Ht=3.36; Qt=.19
Hi=2.28; Ht=3.28; Qt=.19
Hi=2.71; Ht=3.21; Qt=.19
H =3.14
H =3.61
H =4.08
H =4.55
H =5.03
H =5.51
H =5.62

Subsection: Individual Outlet Curves
Label: POND 3 OUTLET

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Area)

Upstream ID = (Pond Water Surface)
Downstream ID = Culvert - 1 (Culvert-Circular)

| [illegible] |
|---|
| H =5.58 |
| H =5.50 |
| H =5.38 |
| H =5.21 |
| H =4.61 |
| H =3.62 |

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Riser - 1 (Inlet Box)

Upstream ID = (Pond Water Surface)
Downstream ID = Culvert - 1 (Culvert-Circular)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6,886.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,886.50 | 0.00 | 0.00 | 0.00 | 6,886.23 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,887.00 | 0.00 | 0.00 | 0.00 | 6,886.36 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,887.50 | 0.00 | 0.00 | 0.00 | 6,886.47 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,888.00 | 0.00 | 0.00 | 0.00 | 6,886.56 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,888.50 | 0.00 | 0.00 | 0.00 | 6,886.64 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,889.00 | 0.00 | 0.00 | 0.00 | 6,886.72 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,889.50 | 0.00 | 0.00 | 0.00 | 6,886.79 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,890.00 | 0.00 | 0.00 | 0.00 | 6,886.86 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,890.50 | 0.00 | 0.00 | 0.00 | 6,886.89 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,891.00 | 0.00 | 0.00 | 0.00 | 6,886.92 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,891.50 | 0.00 | 0.00 | 0.00 | 6,886.95 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.00 | 0.00 | 0.00 | 0.00 | 6,886.97 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.50 | 0.00 | 0.00 | 0.00 | 6,886.99 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.00 | 4.24 | 6,893.00 | Free Outfall | 6,887.38 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.50 | 12.00 | 6,893.50 | Free Outfall | 6,887.92 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.00 | 22.05 | 6,894.00 | Free Outfall | 6,888.50 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.50 | 33.94 | 6,894.50 | Free Outfall | 6,889.12 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.00 | 47.43 | 6,895.00 | Free Outfall | 6,889.79 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.50 | 62.35 | 6,895.50 | Free Outfall | 6,890.89 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,896.00 | 78.57 | 6,896.00 | Free Outfall | 6,892.38 | 0.00 | 0.00 | (N/A) | 0.00 |

| |
|---|
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| Weir: H =0.5ft |

Subsection: Individual Outlet Curves
Label: POND 3 OUTLET

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Riser - 1 (Inlet Box)

Upstream ID = (Pond Water Surface)
Downstream ID = Culvert - 1 (Culvert-Circular)

| Message |
| --- |
| Weir: H =1ft |
| Weir: H =1.5ft |
| Weir: H =2ft |
| Weir: H =2.5ft |
| Weir: H =3ft |
| Weir: H =3.5ft |

Subsection: Individual Outlet Curves
Label: POND 3 OUTLET

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Culvert - 1 (Culvert-Circular)

---

Mannings open channel maximum capacity: 71.74 ft³/s
Upstream ID = Riser - 1, Orifice - 1
Downstream ID = Tailwater (Pond Outfall)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6,886.00 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,886.50 | 0.29 | 6,886.23 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,887.00 | 0.71 | 6,886.36 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,887.50 | 1.16 | 6,886.47 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,888.00 | 1.64 | 6,886.56 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,888.50 | 2.14 | 6,886.64 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,889.00 | 2.67 | 6,886.72 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,889.50 | 3.21 | 6,886.79 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,890.00 | 3.75 | 6,886.86 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,890.50 | 4.02 | 6,886.89 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,891.00 | 4.27 | 6,886.92 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,891.50 | 4.52 | 6,886.95 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.00 | 4.75 | 6,886.97 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.50 | 4.97 | 6,886.99 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.00 | 9.27 | 6,887.38 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.50 | 16.99 | 6,887.92 | Free Outfall | Free Outfall | 0.00 | 0.01 | (N/A) | 0.00 |
| 6,894.00 | 27.00 | 6,888.50 | Free Outfall | Free Outfall | 0.00 | 0.01 | (N/A) | 0.00 |
| 6,894.50 | 38.83 | 6,889.12 | Free Outfall | Free Outfall | 0.00 | 0.03 | (N/A) | 0.00 |
| 6,895.00 | 52.23 | 6,889.79 | Free Outfall | Free Outfall | 0.00 | 0.03 | (N/A) | 0.00 |
| 6,895.50 | 66.85 | 6,890.89 | Free Outfall | Free Outfall | 0.00 | 0.05 | (N/A) | 0.00 |
| 6,896.00 | 82.54 | 6,892.38 | Free Outfall | Free Outfall | 0.00 | 0.07 | (N/A) | 0.00 |

WS below an invert; no flow.
CRIT.DEPTH CONTROL Vh= .056ft
Dcr= .165ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .088ft
Dcr= .260ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .114ft
Dcr= .333ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .136ft
Dcr= .397ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .157ft
Dcr= .454ft CRIT.DEPTH Hev= .00ft
FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE

Subsection: Individual Outlet Curves
Label: POND 3 OUTLET

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

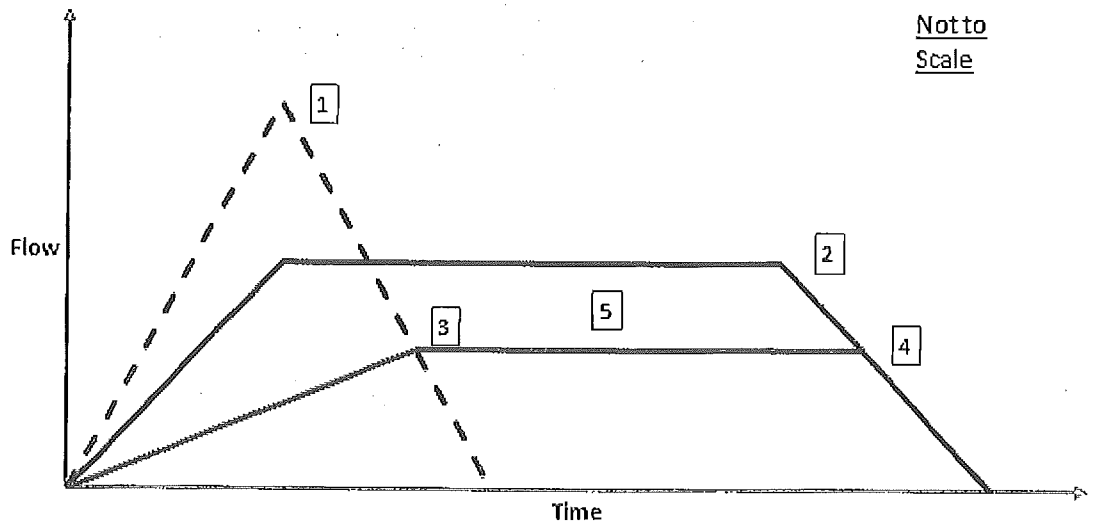
RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Culvert - 1 (Culvert-Circular)
---
Mannings open channel maximum capacity: 71.74 ft³/s
Upstream ID = Riser - 1, Orifice - 1
Downstream ID = Tailwater (Pond Outfall)

| Message |
| --- |
| FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE |
| FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE |
| FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE |
| CRIT.DEPTH CONTROL Vh= .227ft Dcr= .646ft CRIT.DEPTH Hev= .00ft |
| FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE |
| FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE |
| FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE |
| FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE |
| CRIT.DEPTH CONTROL Vh= .502ft Dcr= 1.318ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .683ft Dcr= 1.679ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .906ft Dcr= 2.028ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= 1.202ft Dcr= 2.350ft CRIT.DEPTH Hev= .00ft |
| INLET CONTROL... Submerged: HW =4.89 |
| INLET CONTROL... Submerged: HW =6.38 |

Subsection: Modified Rational Graph
Label: BASIN D1 & D6

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

| Method Type | Method T |
|---|---|
| Time of Duration (Modified Rational, Critical) | 0.983 hours |




| [1] | | | [2] | | |
|---|---|---|---|---|---|
| Time of Concentration (Modified Rational, Composite) | 0.298 | hours | Time of Duration (Modified Rational, Critical) | 0.983 | hours |
| Intensity (Modified Rational, Peak) | 3.201 | in/h | Intensity (Modified Rational, Critical) | 1.598 | in/h |
| Flow (Modified Rational, Peak) | 33.55 | ft³/s | Flow (Modified Rational, Critical) | 16.75 | ft³/s |

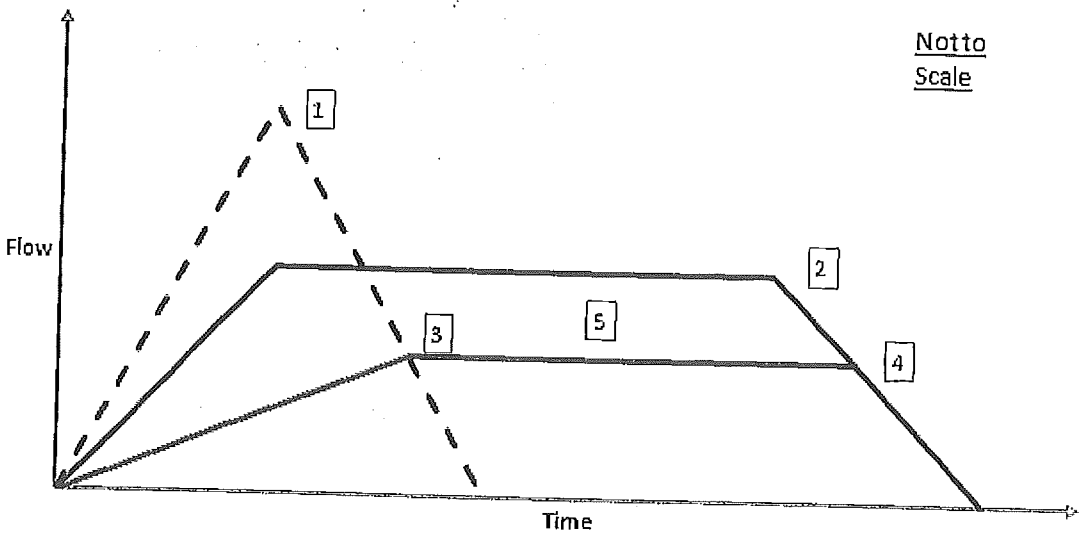
| [3] | |
|---|---|
| First Outflow Breakpoint (Modified Rational, Method T) | 1.177 hours |
| Flow (Modified Rational, Allowable) | 5.89 ft³/s |

| [4] | | | [5] | | |
|---|---|---|---|---|---|
| Second Outflow Breakpoint (Modified Rational) | 0.544 | hours | Storage (Modified Rational, Estimated) | 0.896 | ac-ft |
| Flow (Modified Rational, Allowable) | 5.89 | ft³/s | | | |

Subsection: Modified Rational Graph
Label: BASIN D2-D4&D7

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

| Method Type | Method T |
|---|---|
| Time of Duration (Modified Rational, Critical) | 0.717 hours |




| [1] | | | [2] | | |
|---|---|---|---|---|---|
| Time of Concentration (Modified Rational, Composite) | 0.305 | hours | Time of Duration (Modified Rational, Critical) | 0.717 | hours |
| Intensity (Modified Rational, Peak) | 3.163 | in/h | Intensity (Modified Rational, Critical) | 1.956 | in/h |
| Flow (Modified Rational, Peak) | 52.73 | ft³/s | Flow (Modified Rational, Critical) | 32.61 | ft³/s |

| [3] | |
|---|---|
| First Outflow Breakpoint (Modified Rational, Method T) | 0.898 hours |
| Flow (Modified Rational, Allowable) | 13.21 ft³/s |

| [4] | | | [5] | | |
|---|---|---|---|---|---|
| Second Outflow Breakpoint (Modified Rational) | 0.534 | hours | Storage (Modified Rational, Estimated) | 1.175 | ac-ft |
| Flow (Modified Rational, Allowable) | 13.21 | ft³/s | | | |

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| Project Summary | |
|---|---|
| Title | POND 3A 100 YEAR EVENT |
| Engineer | |
| Company | |
| Date | 8/15/2012 |

Notes

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Subsection: Modified Rational Grand Summary

## Modified Rational Method

**Q = CiA * Units Conversion; Where conversion = 43560 / (12 * 3600)**

| [illegible] (years) | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|---|---|---|
| 100 | 18.900 | 0.650 | 0.883 | 3.052 | 37.81 | 14.66 | 2.760 | 1.721 |
| 100 | 28.200 | 0.669 | 0.550 | 4.088 | 77.71 | 32.90 | 3.532 | 2.085 |

Subsection: Master Network Summary

## Catchments Summary

| | | | | | |
|---|---|---|---|---|---|
| BASIN D1 & D6 | Post-Development 100 year | 100 | 2.754 | 0.300 | 37.81 |
| BASIN D2-D4&D7 | Post-Development 100 year | 100 | 3.532 | 0.350 | 77.71 |

## Node Summary

| | | | | | |
|---|---|---|---|---|---|
| RELEASE | Post-Development 100 year | 100 | 6.276 | 0.750 | 65.29 |

## Pond Summary

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| POND 3A (IN) | Post-Development 100 year | 100 | 3.532 | 0.350 | 77.71 | (N/A) | (N/A) |
| POND 3A (OUT) | Post-Development 100 year | 100 | 3.522 | 0.750 | 27.49 | 6,894.02 | 2.935 |

Subsection: I-D-F Table
Label: CO SPRINGS

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

**I-D-F Curve**

| | |
|---|---|
| 0.083 | 9.070 |
| 0.167 | 7.290 |
| 0.250 | 6.160 |
| 0.333 | 5.360 |
| 0.417 | 4.770 |
| 0.500 | 4.310 |
| 0.583 | 3.940 |
| 0.667 | 3.630 |
| 0.750 | 3.380 |
| 0.833 | 3.160 |
| 0.917 | 2.980 |
| 1.000 | 2.810 |

Subsection: Elevation-Area Volume Curve
Label: POND 3A

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

| | | | | | |
|---|---|---|---|---|---|
| 6,886.00 | 0.0 | 0.210 | 0.000 | 0.000 | 0.000 |
| 6,888.00 | 0.0 | 0.280 | 0.732 | 0.488 | 0.488 |
| 6,890.00 | 0.0 | 0.360 | 0.957 | 0.638 | 1.127 |
| 6,892.00 | 0.0 | 0.450 | 1.212 | 0.808 | 1.935 |
| 6,894.00 | 0.0 | 0.540 | 1.483 | 0.989 | 2.924 |
| 6,896.00 | 0.0 | 0.640 | 1.768 | 1.179 | 4.102 |

Subsection: Outlet Input Data
Label: POND 3 OUTLET

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

| Requested Pond Water Surface Elevations | |
|---|---|
| Minimum (Headwater) | 6,886.00 ft |
| Increment (Headwater) | 0.50 ft |
| Maximum (Headwater) | 6,896.00 ft |

## Outlet Connectivity

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|
| Inlet Box | Riser - 1 | Forward | Culvert - 1 | 6,892.50 | 6,896.00 |
| Orifice-Area | Orifice - 1 | Forward | Culvert - 1 | 6,886.00 | 6,896.00 |
| Culvert-Circular | Culvert - 1 | Forward | TW | 6,886.00 | 6,896.00 |
| Tailwater Settings | Tailwater | | | (N/A) | (N/A) |

| Structure ID: Orifice - 1<br>Structure Type: Orifice-Area | |
|---|---|
| Number of Openings | 20 |
| Elevation | 6,886.00 ft |
| Orifice Area | 0.0 ft² |
| Top Elevation | 6,890.00 ft |
| Datum Elevation | 6,886.00 ft |
| Orifice Coefficient | 0.600 |

| Structure ID: Riser - 1<br>Structure Type: Inlet Box | |
|---|---|
| Number of Openings | 1 |
| Elevation | 6,892.50 ft |
| Orifice Area | 10.2 ft² |
| Orifice Coefficient | 0.600 |
| Weir Length | 4.00 ft |
| Weir Coefficient | 3.00 (ft^0.5)/s |
| K Reverse | 1.000 |
| Manning's n | 0.000 |
| Kev, Charged Riser | 0.000 |
| Weir Submergence | False |
| Orifice H to crest | False |

| Structure ID: Culvert - 1<br>Structure Type: Culvert-Circular | |
|---|---|
| Number of Barrels | 1 |
| Diameter | 36.0 in |
| Length | 100.00 ft |
| Length (Computed Barrel) | 100.00 ft |
| Slope (Computed) | 0.010 ft/ft |

| Outlet Control Data | |
|---|---|
| Manning's n | 0.013 |
| Ke | 0.200 |
| Kb | 0.007 |
| Kr | 0.000 |
| Convergence Tolerance | 0.00 ft |

| Inlet Control Data | |
|---|---|
| Equation Form | Form 1 |
| K | 0.0045 |
| M | 2.0000 |
| C | 0.0317 |

Subsection: Outlet Input Data
Label: POND 3 OUTLET

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

| Inlet Control Data | |
|---|---|
| Y | 0.6900 |
| T1 ratio (HW/D) | 1.090 |
| T2 ratio (HW/D) | 1.192 |
| Slope Correction Factor | -0.500 |

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

| | | | |
|---|---|---|---|
| T1 Elevation | 6,889.27 ft | T1 Flow | 42.85 $ft^3/s$ |
| T2 Elevation | 6,889.58 ft | T2 Flow | 48.97 $ft^3/s$ |

| Structure ID: TW<br>Structure Type: TW Setup, DS Channel | |
|---|---|
| Tailwater Type | Free Outfall |
| **Convergence Tolerances** | |
| Maximum Iterations | 30 |
| Tailwater Tolerance (Minimum) | 0.01 ft |
| Tailwater Tolerance (Maximum) | 0.50 ft |
| Headwater Tolerance (Minimum) | 0.01 ft |
| Headwater Tolerance (Maximum) | 0.50 ft |
| Flow Tolerance (Minimum) | 0.001 $ft^3/s$ |
| Flow Tolerance (Maximum) | 10.000 $ft^3/s$ |

Subsection: Individual Outlet Curves
Label: POND 3 OUTLET

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Area)

Upstream ID = (Pond Water Surface)
Downstream ID = Culvert - 1 (Culvert-Circular)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6,886.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,886.50 | 0.29 | 6,886.50 | 6,886.23 | 6,886.23 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,887.00 | 0.71 | 6,887.00 | 6,886.36 | 6,886.36 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,887.50 | 1.16 | 6,887.50 | 6,886.47 | 6,886.47 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,888.00 | 1.64 | 6,888.00 | 6,886.56 | 6,886.56 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,888.50 | 2.15 | 6,888.50 | 6,886.64 | 6,886.64 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,889.00 | 2.67 | 6,889.00 | 6,886.72 | 6,886.72 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,889.50 | 3.20 | 6,889.50 | 6,886.79 | 6,886.79 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,890.00 | 3.75 | 6,890.00 | 6,886.86 | 6,886.86 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,890.50 | 4.02 | 6,890.50 | 6,886.89 | 6,886.89 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,891.00 | 4.28 | 6,891.00 | 6,886.92 | 6,886.92 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,891.50 | 4.52 | 6,891.50 | 6,886.95 | 6,886.95 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.00 | 4.75 | 6,892.00 | 6,886.97 | 6,886.97 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.50 | 4.97 | 6,892.50 | 6,886.99 | 6,886.99 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.00 | 5.02 | 6,893.00 | 6,887.38 | 6,887.38 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.50 | 5.00 | 6,893.50 | 6,887.92 | 6,887.92 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.00 | 4.97 | 6,894.00 | 6,888.50 | 6,888.50 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.50 | 4.91 | 6,894.50 | 6,889.12 | 6,889.12 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.00 | 4.83 | 6,895.00 | 6,889.79 | 6,889.79 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.50 | 4.55 | 6,895.50 | 6,890.89 | 6,890.89 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,896.00 | 4.03 | 6,896.00 | 6,892.38 | 6,892.38 | 0.00 | 0.00 | (N/A) | 0.00 |

WS below an invert; no flow.
Hi=.27; Ht=3.77; Qt=.21
Hi=.64; Ht=3.64; Qt=.20
Hi=1.03; Ht=3.53; Qt=.20
Hi=1.44; Ht=3.44; Qt=.20
Hi=1.86; Ht=3.36; Qt=.19
Hi=2.28; Ht=3.28; Qt=.19
Hi=2.71; Ht=3.21; Qt=.19
H =3.14
H =3.61
H =4.08
H =4.55
H =5.03
H =5.51
H =5.62

Subsection: Individual Outlet Curves
Label: POND 3 OUTLET

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Area)
---
Upstream ID = (Pond Water Surface)
Downstream ID = Culvert - 1 (Culvert-Circular)

| Message |
|---|
| H =5.58 |
| H =5.50 |
| H =5.38 |
| H =5.21 |
| H =4.61 |
| H =3.62 |

Subsection: Individual Outlet Curves
Label: POND 3 OUTLET

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Riser - 1 (Inlet Box)

Upstream ID = (Pond Water Surface)
Downstream ID = Culvert - 1 (Culvert-Circular)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6,886.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,886.50 | 0.00 | 0.00 | 0.00 | 6,886.23 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,887.00 | 0.00 | 0.00 | 0.00 | 6,886.36 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,887.50 | 0.00 | 0.00 | 0.00 | 6,886.47 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,888.00 | 0.00 | 0.00 | 0.00 | 6,886.56 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,888.50 | 0.00 | 0.00 | 0.00 | 6,886.64 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,889.00 | 0.00 | 0.00 | 0.00 | 6,886.72 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,889.50 | 0.00 | 0.00 | 0.00 | 6,886.79 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,890.00 | 0.00 | 0.00 | 0.00 | 6,886.86 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,890.50 | 0.00 | 0.00 | 0.00 | 6,886.89 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,891.00 | 0.00 | 0.00 | 0.00 | 6,886.92 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,891.50 | 0.00 | 0.00 | 0.00 | 6,886.95 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.00 | 0.00 | 0.00 | 0.00 | 6,886.97 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.50 | 0.00 | 0.00 | 0.00 | 6,886.99 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.00 | 4.24 | 6,893.00 | Free Outfall | 6,887.38 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.50 | 12.00 | 6,893.50 | Free Outfall | 6,887.92 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.00 | 22.05 | 6,894.00 | Free Outfall | 6,888.50 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.50 | 33.94 | 6,894.50 | Free Outfall | 6,889.12 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.00 | 47.43 | 6,895.00 | Free Outfall | 6,889.79 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,895.50 | 62.35 | 6,895.50 | Free Outfall | 6,890.89 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,896.00 | 78.57 | 6,896.00 | Free Outfall | 6,892.38 | 0.00 | 0.00 | (N/A) | 0.00 |

| |
|---|
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| Weir: H =0.5ft |

Subsection: Individual Outlet Curves
Label: POND 3 OUTLET

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Riser - 1 (Inlet Box)

Upstream ID = (Pond Water Surface)
Downstream ID = Culvert - 1 (Culvert-Circular)

| [illegible] |
|---|
| Weir: H =1ft |
| Weir: H =1.5ft |
| Weir: H =2ft |
| Weir: H =2.5ft |
| Weir: H =3ft |
| Weir: H =3.5ft |

Subsection: Individual Outlet Curves
Label: POND 3 OUTLET

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Culvert - 1 (Culvert-Circular)

Mannings open channel maximum capacity: 71.74 ft³/s
Upstream ID = Riser - 1, Orifice - 1
Downstream ID = Tailwater (Pond Outfall)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6,886.00 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,886.50 | 0.29 | 6,886.23 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,887.00 | 0.71 | 6,886.36 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,887.50 | 1.16 | 6,886.47 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,888.00 | 1.64 | 6,886.56 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,888.50 | 2.14 | 6,886.64 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,889.00 | 2.67 | 6,886.72 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,889.50 | 3.21 | 6,886.79 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,890.00 | 3.75 | 6,886.86 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,890.50 | 4.02 | 6,886.89 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,891.00 | 4.27 | 6,886.92 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,891.50 | 4.52 | 6,886.95 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.00 | 4.75 | 6,886.97 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,892.50 | 4.97 | 6,886.99 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.00 | 9.27 | 6,887.38 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,893.50 | 16.99 | 6,887.92 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,894.00 | 27.00 | 6,888.50 | Free Outfall | Free Outfall | 0.00 | 0.01 | (N/A) | 0.00 |
| 6,894.50 | 38.83 | 6,889.12 | Free Outfall | Free Outfall | 0.00 | 0.01 | (N/A) | 0.00 |
| 6,895.00 | 52.23 | 6,889.79 | Free Outfall | Free Outfall | 0.00 | 0.03 | (N/A) | 0.00 |
| 6,895.50 | 66.85 | 6,890.89 | Free Outfall | Free Outfall | 0.00 | 0.03 | (N/A) | 0.00 |
| 6,896.00 | 82.54 | 6,892.38 | Free Outfall | Free Outfall | 0.00 | 0.05 | (N/A) | 0.00 |
| | | | | | | 0.07 | | |

WS below an invert; no flow.
CRIT.DEPTH CONTROL Vh= .056ft
Dcr= .165ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .088ft
Dcr= .260ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .114ft
Dcr= .333ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .136ft
Dcr= .397ft CRIT.DEPTH Hev= .00ft
CRIT.DEPTH CONTROL Vh= .157ft
Dcr= .454ft CRIT.DEPTH Hev= .00ft
FLOW PRECEDENCE SET TO
UPSTREAM CONTROLLING
STRUCTURE

Subsection: Individual Outlet Curves
Label: POND 3 OUTLET

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Culvert - 1 (Culvert-Circular)

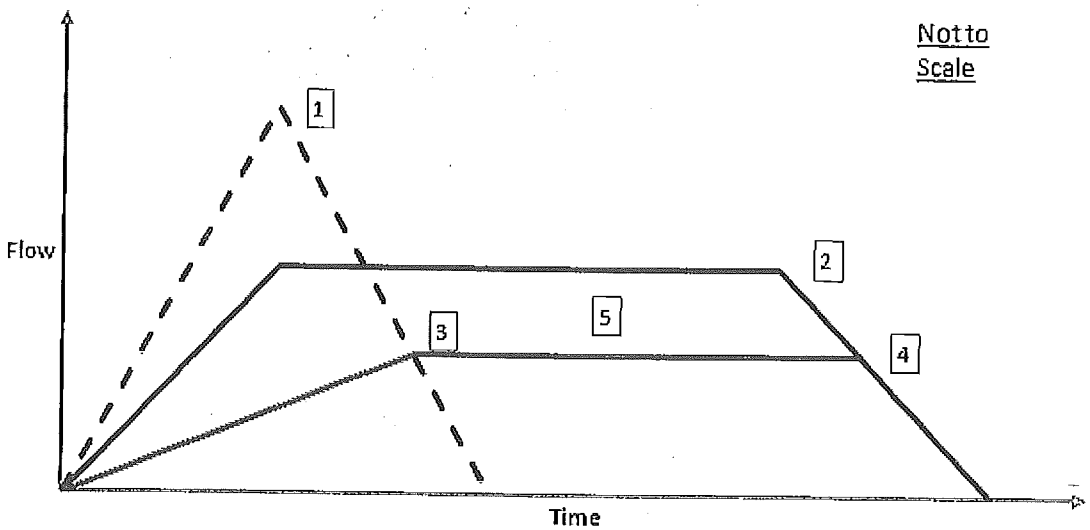
Mannings open channel maximum capacity: 71.74 ft³/s
Upstream ID = Riser - 1, Orifice - 1
Downstream ID = Tailwater (Pond Outfall)

| Message |
| --- |
| FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE |
| FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE |
| FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE |
| CRIT.DEPTH CONTROL Vh= .227ft Dcr= .646ft CRIT.DEPTH Hev= .00ft |
| FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE |
| FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE |
| FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE |
| FLOW PRECEDENCE SET TO UPSTREAM CONTROLLING STRUCTURE |
| CRIT.DEPTH CONTROL Vh= .502ft Dcr= 1.318ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .683ft Dcr= 1.679ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .906ft Dcr= 2.028ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= 1.202ft Dcr= 2.350ft CRIT.DEPTH Hev= .00ft |
| INLET CONTROL... Submerged: HW =4.89 |
| INLET CONTROL... Submerged: HW =6.38 |

Subsection: Modified Rational Graph
Label: BASIN D1 & D6

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

| Method Type | Method T |
|---|---|
| Time of Duration (Modified Rational, Critical) | 0.883 hours |




| [1] | | | [2] | | |
|---|---|---|---|---|---|
| Time of Concentration (Modified Rational, Composite) | 0.270 | hours | Time of Duration (Modified Rational, Critical) | 0.883 | hours |
| Intensity (Modified Rational, Peak) | 5.968 | in/h | Intensity (Modified Rational, Critical) | 3.052 | in/h |
| Flow (Modified Rational, Peak) | 73.93 | ft³/s | Flow (Modified Rational, Critical) | 37.81 | ft³/s |

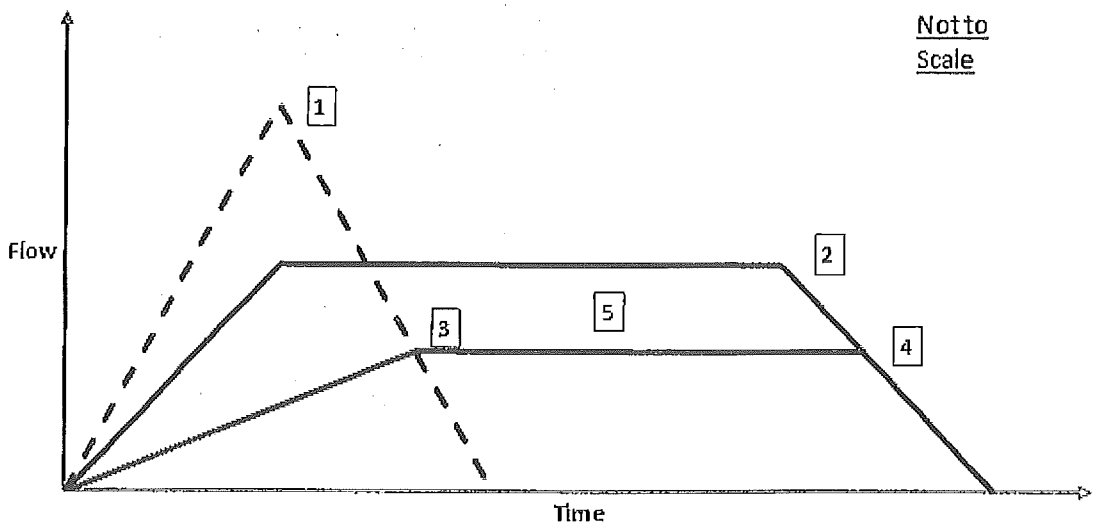
| [3] | |
|---|---|
| First Outflow Breakpoint (Modified Rational, Method T) | 1.049 hours |
| Flow (Modified Rational, Allowable) | 14.66 ft³/s |

| [4] | | | [5] | | |
|---|---|---|---|---|---|
| Second Outflow Breakpoint (Modified Rational) | 0.486 | hours | Storage (Modified Rational, Estimated) | 1.721 | ac-ft |
| Flow (Modified Rational, Allowable) | 14.66 | ft³/s | | | |

Subsection: Modified Rational Graph
Label: BASIN D2-D4&D7

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

| Method Type | Method T |
|---|---|
| Time of Duration (Modified Rational, Critical) | 0.550 hours |




| [1] | | | [2] | | |
|---|---|---|---|---|---|
| Time of Concentration (Modified Rational, Composite) | 0.305 | hours | Time of Duration (Modified Rational, Critical) | 0.550 | hours |
| Intensity (Modified Rational, Peak) | 5.632 | in/h | Intensity (Modified Rational, Critical) | 4.088 | in/h |
| Flow (Modified Rational, Peak) | 107.06 | ft³/s | Flow (Modified Rational, Critical) | 77.71 | ft³/s |

| [3] | |
|---|---|
| First Outflow Breakpoint (Modified Rational, Method T) | 0.726 hours |
| Flow (Modified Rational, Allowable) | 32.90 ft³/s |

| [4] | | | [5] | | |
|---|---|---|---|---|---|
| Second Outflow Breakpoint (Modified Rational) | 0.516 | hours | Storage (Modified Rational, Estimated) | 2.085 | ac-ft |
| Flow (Modified Rational, Allowable) | 32.90 | ft³/s | | | |

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POND 3A (Elevation-Area Volume Curve, 100 years)...5

## Project Summary

| | |
|---|---|
| Title | POND 3B 5YR EVENT |
| Engineer | |
| Company | |
| Date | 11/9/2012 |

Notes

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Subsection: Modified Rational Grand Summary

## Modified Rational Method

### Q = CiA * Units Conversion; Where conversion = 43560 / (12 * 3600)

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|---|---|---|
| 5 | 22.800 | 0.583 | 0.333 | 3.010 | 40.34 | 30.07 | 1.111 | 0.305 |
| 5 | 7.600 | 0.623 | 0.250 | 3.460 | 16.53 | 15.00 | 0.342 | 0.040 |

Subsection: Master Network Summary

## Catchments Summary

| | | | | | |
|---|---|---|---|---|---|
| BASIN C4&C5 | Post-Development 5 yr | 5 | 1.107 | 0.300 | 40.34 |
| C6-C7 | Post-Development 5 yr | 5 | 0.342 | 0.250 | 16.53 |

## Node Summary

| | | | | | |
|---|---|---|---|---|---|
| RELEASE | Post-Development 5 yr | 5 | 1.025 | 0.400 | 20.62 |

## Pond Summary

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| POND 3B (IN) | Post-Development 5 yr | 5 | 1.107 | 0.300 | 40.34 | (N/A) | (N/A) |
| POND 3B (OUT) | Post-Development 5 yr | 5 | 0.683 | 0.500 | 18.73 | 6,926.33 | 0.796 |

Subsection: I-D-F Table
Label: CO SPRINGS

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

**I-D-F Curve**

| | |
|---|---|
| 0.083 | 5.100 |
| 0.167 | 4.100 |
| 0.250 | 3.460 |
| 0.333 | 3.010 |
| 0.417 | 2.680 |
| 0.500 | 2.420 |
| 0.583 | 2.210 |
| 0.667 | 2.040 |
| 0.750 | 1.900 |
| 0.833 | 1.780 |
| 0.917 | 1.670 |
| 1.000 | 1.580 |

Subsection: Elevation-Area Volume Curve
Label: POND 3B

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

| [illegible] | [illegible] | [illegible] | [illegible] (acres) | [illegible] | [illegible] |
|---|---|---|---|---|---|
| 6,922.00 | 0.0 | 0.088 | 0.000 | 0.000 | 0.000 |
| 6,924.00 | 0.0 | 0.170 | 0.380 | 0.254 | 0.254 |
| 6,926.00 | 0.0 | 0.280 | 0.668 | 0.445 | 0.699 |
| 6,928.00 | 0.0 | 0.420 | 1.043 | 0.695 | 1.394 |

| Requested Pond Water Surface Elevations | |
|---|---|
| Minimum (Headwater) | 6,922.00 ft |
| Increment (Headwater) | 0.50 ft |
| Maximum (Headwater) | 6,928.00 ft |

## Outlet Connectivity

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|
| Orifice-Circular | Orifice - 1 | Forward | TW | 6,922.00 | 6,928.00 |
| Inlet Box | Riser - 1 | Forward | Culvert - 1 | 6,925.00 | 6,928.00 |
| Culvert-Circular | Culvert - 1 | Forward | TW | 6,922.00 | 6,928.00 |
| Tailwater Settings | Tailwater | | | (N/A) | (N/A) |

Subsection: Outlet Input Data
Label: Composite Outlet Structure - 1

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

| Structure ID: Culvert - 1<br>Structure Type: Culvert-Circular | |
|---|---|
| Number of Barrels | 1 |
| Diameter | 36.0 in |
| Length | 50.00 ft |
| Length (Computed Barrel) | 50.01 ft |
| Slope (Computed) | 0.020 ft/ft |

| Outlet Control Data | |
|---|---|
| Manning's n | 0.013 |
| Ke | 0.200 |
| Kb | 0.007 |
| Kr | 0.000 |
| Convergence Tolerance | 0.00 ft |

| Inlet Control Data | |
|---|---|
| Equation Form | Form 1 |
| K | 0.0045 |
| M | 2.0000 |
| C | 0.0317 |
| Y | 0.6900 |
| T1 ratio (HW/D) | 1.085 |
| T2 ratio (HW/D) | 1.187 |
| Slope Correction Factor | -0.500 |

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

| | | | |
|---|---|---|---|
| T1 Elevation | 6,925.26 ft | T1 Flow | 42.85 ft³/s |
| T2 Elevation | 6,925.56 ft | T2 Flow | 48.97 ft³/s |

Subsection: Outlet Input Data
Label: Composite Outlet Structure - 1

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

| Structure ID: Riser - 1<br>Structure Type: Inlet Box | |
|---|---|
| Number of Openings | 1 |
| Elevation | 6,925.00 ft |
| Orifice Area | 10.2 ft² |
| Orifice Coefficient | 0.600 |
| Weir Length | 4.00 ft |
| Weir Coefficient | 3.00 (ft^0.5)/s |
| K Reverse | 1.000 |
| Manning's n | 0.000 |
| Kev, Charged Riser | 0.000 |
| Weir Submergence | False |
| Orifice H to crest | False |

| Structure ID: Orifice - 1<br>Structure Type: Orifice-Circular | |
|---|---|
| Number of Openings | 5 |
| Elevation | 6,922.00 ft |
| Orifice Diameter | 0.3 in |
| Orifice Coefficient | 0.600 |

| Structure ID: TW<br>Structure Type: TW Setup, DS Channel | |
|---|---|
| Tailwater Type | Free Outfall |

| Convergence Tolerances | |
|---|---|
| Maximum Iterations | 30 |
| Tailwater Tolerance (Minimum) | 0.01 ft |
| Tailwater Tolerance (Maximum) | 0.50 ft |
| Headwater Tolerance (Minimum) | 0.01 ft |
| Headwater Tolerance (Maximum) | 0.50 ft |
| Flow Tolerance (Minimum) | 0.001 ft³/s |
| Flow Tolerance (Maximum) | 10.000 ft³/s |

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Culvert - 1 (Culvert-Circular)

Mannings open channel maximum capacity: 101.46 ft³/s
Upstream ID = Riser - 1 (Inlet Box)
Downstream ID = Tailwater (Pond Outfall)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6,922.00 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,922.50 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,923.00 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,923.50 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,924.00 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,924.50 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,925.00 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,925.50 | 4.24 | 6,922.91 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,926.00 | 12.00 | 6,923.59 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,926.50 | 22.05 | 6,924.22 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,927.00 | 33.94 | 6,924.87 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,927.50 | 47.43 | 6,925.55 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,928.00 | 62.35 | 6,926.51 | Free Outfall | Free Outfall | 0.00 | 0.01 | (N/A) | 0.00 |

| |
|---|
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| CRIT.DEPTH CONTROL Vh= .226ft Dcr= .644ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .406ft Dcr= 1.100ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .594ft Dcr= 1.510ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .811ft Dcr= 1.892ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= 1.088ft Dcr= 2.243ft CRIT.DEPTH Hev= .00ft |
| INLET CONTROL... Submerged: HW =4.51 |

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Riser - 1 (Inlet Box)

Upstream ID = (Pond Water Surface)
Downstream ID = Culvert - 1 (Culvert-Circular)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6,922.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,922.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,923.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,923.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,924.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,924.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,925.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,925.50 | 4.24 | 6,925.50 | Free Outfall | 6,922.91 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,926.00 | 12.00 | 6,926.00 | Free Outfall | 6,923.59 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,926.50 | 22.05 | 6,926.50 | Free Outfall | 6,924.22 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,927.00 | 33.94 | 6,927.00 | Free Outfall | 6,924.87 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,927.50 | 47.43 | 6,927.50 | 6,925.55 | 6,925.55 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,928.00 | 62.35 | 6,928.00 | 6,926.51 | 6,926.51 | 0.00 | 0.00 | (N/A) | 0.00 |

| |
|---|
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| Weir: H =0.5ft |
| Weir: H =1ft |
| Weir: H =1.5ft |
| Weir: H =2ft |
| FULLY CHARGED RISER: ADJUSTED TO WEIR: H =2.5ft |
| FULLY CHARGED RISER: ADJUSTED TO WEIR: H =3ft |

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

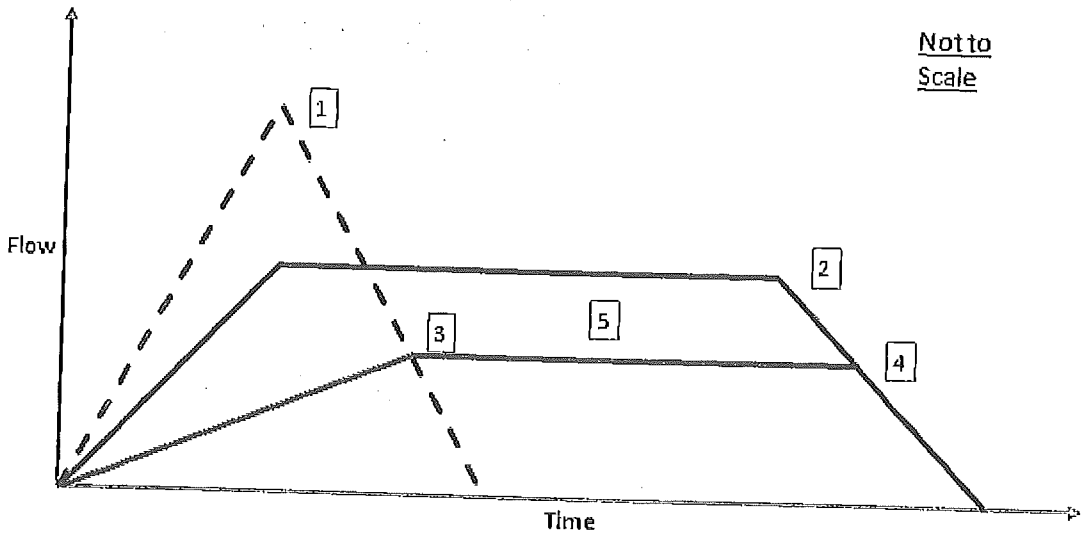
| [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|
| 6,922.00 | 0.00 | (N/A) | 0.00 |
| 6,922.50 | 0.01 | (N/A) | 0.00 |
| 6,923.00 | 0.01 | (N/A) | 0.00 |
| 6,923.50 | 0.01 | (N/A) | 0.00 |
| 6,924.00 | 0.01 | (N/A) | 0.00 |
| 6,924.50 | 0.01 | (N/A) | 0.00 |
| 6,925.00 | 0.01 | (N/A) | 0.00 |
| 6,925.50 | 0.02 | (N/A) | 0.00 |
| 6,926.00 | 0.02 | (N/A) | 0.00 |
| 6,926.50 | 0.02 | (N/A) | 0.00 |
| 6,927.00 | 0.02 | (N/A) | 0.00 |
| 6,927.50 | 0.02 | (N/A) | 0.00 |
| 6,928.00 | 0.02 | (N/A) | 0.00 |

| [illegible] |
|---|
| WS below an invert; no flow. |
| H =.49 |
| H =.99 |
| H =1.49 |
| H =1.99 |
| H =2.49 |
| H =2.99 |
| H =3.49 |
| H =3.99 |
| H =4.49 |
| H =4.99 |
| H =5.49 |
| H =5.99 |

Subsection: Modified Rational Graph
Label: BASIN C4&C5

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

| Method Type | Method T |
|---|---|
| Time of Duration (Modified Rational, Critical) | 0.333 hours |




| [1] | | | [2] | | |
|---|---|---|---|---|---|
| Time of Concentration (Modified Rational, Composite) | 0.280 | hours | Time of Duration (Modified Rational, Critical) | 0.333 | hours |
| Intensity (Modified Rational, Peak) | 3.298 | in/h | Intensity (Modified Rational, Critical) | 3.010 | in/h |
| Flow (Modified Rational, Peak) | 44.20 | ft³/s | Flow (Modified Rational, Critical) | 40.34 | ft³/s |

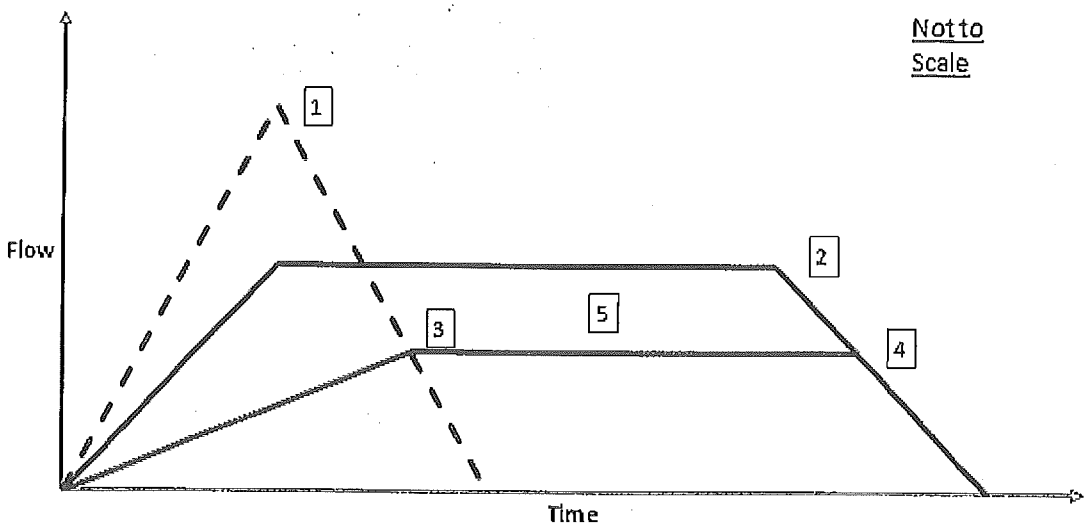
| [3] | |
|---|---|
| First Outflow Breakpoint (Modified Rational, Method T) | 0.405 hours |
| Flow (Modified Rational, Allowable) | 30.07 ft³/s |

| [4] | | | [5] | | |
|---|---|---|---|---|---|
| Second Outflow Breakpoint (Modified Rational) | 0.369 | hours | Storage (Modified Rational, Estimated) | 0.305 | ac-ft |
| Flow (Modified Rational, Allowable) | 30.07 | ft³/s | | | |

Subsection: Modified Rational Graph
Label: C6-C7

Return Event: 5 years
Storm Event: CO SPRINGS - 5 Year

| Method Type | Method T |
|---|---|
| Time of Duration (Modified Rational, Critical) | 0.250 hours |




| [1] | | | [2] | | |
|---|---|---|---|---|---|
| Time of Concentration (Modified Rational, Composite) | 0.218 | hours | Time of Duration (Modified Rational, Critical) | 0.250 | hours |
| Intensity (Modified Rational, Peak) | 3.706 | in/h | Intensity (Modified Rational, Critical) | 3.460 | in/h |
| Flow (Modified Rational, Peak) | 17.70 | ft³/s | Flow (Modified Rational, Critical) | 16.53 | ft³/s |

| [3] | |
|---|---|
| First Outflow Breakpoint (Modified Rational, Method T) | 0.270 hours |
| Flow (Modified Rational, Allowable) | 15.00 ft³/s |

| [4] | | | [5] | | |
|---|---|---|---|---|---|
| Second Outflow Breakpoint (Modified Rational) | 0.251 | hours | Storage (Modified Rational, Estimated) | 0.040 | ac-ft |
| Flow (Modified Rational, Allowable) | 15.00 | ft³/s | | | |

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## Project Summary

| | |
|---|---|
| Title | POND 3B 100 YEAR EVENT |
| Engineer | |
| Company | |
| Date | 11/9/2012 |

Notes

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Subsection: Modified Rational Grand Summary

## Modified Rational Method

**Q = CiA * Units Conversion; Where conversion = 43560 / (12 * 3600)**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 100 | 22.800 | 0.683 | 0.333 | 5.360 | 84.15 | 74.98 | 2.318 | 0.320 |
| 100 | 7.600 | 0.623 | 0.250 | 6.160 | 29.43 | 25.00 | 0.608 | 0.104 |

Subsection: Master Network Summary

## Catchments Summary

| [illegible] | [illegible] | Return Event (yrs) | Hydrograph Volume (ac-ft) | Inflow Peak (cfs) | Time to Peak (hours) |
|---|---|---|---|---|---|
| BASIN C4&C5 | Post-Development 100 yr | 100 | 2.310 | 0.300 | 84.15 |
| C6-C7 | Post-Development 100 yr | 100 | 0.608 | 0.250 | 29.43 |

## Node Summary

| [illegible] | [illegible] | Return Event (yrs) | Hydrograph Volume (ac-ft) | Inflow Peak (cfs) | Time to Peak (hours) |
|---|---|---|---|---|---|
| RELEASE | Post-Development 100 yr | 100 | 2.494 | 0.400 | 60.91 |

## Pond Summary

| [illegible] | Scenario | Return Event (yrs) | Hydrograph Volume (ac-ft) | Time to Peak (hours) | Peak Inflow (cfs) | Maximum Water Surface Elevation (ft) | Maximum Pond Storage (ac-ft) |
|---|---|---|---|---|---|---|---|
| POND 3B (IN) | Post-Development 100 yr | 100 | 2.310 | 0.300 | 84.15 | (N/A) | (N/A) |
| POND 3B (OUT) | Post-Development 100 yr | 100 | 1.886 | 0.450 | 53.03 | 6,927.69 | 1.267 |

Subsection: I-D-F Table
Label: CO SPRINGS

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

**I-D-F Curve**

| Time (hours) | Intensity (in/hr) |
|---|---|
| 0.083 | 9.070 |
| 0.167 | 7.290 |
| 0.250 | 6.160 |
| 0.333 | 5.360 |
| 0.417 | 4.770 |
| 0.500 | 4.310 |
| 0.583 | 3.940 |
| 0.667 | 3.630 |
| 0.750 | 3.380 |
| 0.833 | 3.160 |
| 0.917 | 2.980 |
| 1.000 | 2.810 |

Subsection: Elevation-Area Volume Curve
Label: POND 3B

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

| | | | | | |
|---|---|---|---|---|---|
| 6,922.00 | 0.0 | 0.088 | 0.000 | 0.000 | 0.000 |
| 6,924.00 | 0.0 | 0.170 | 0.380 | 0.254 | 0.254 |
| 6,926.00 | 0.0 | 0.280 | 0.668 | 0.445 | 0.699 |
| 6,928.00 | 0.0 | 0.420 | 1.043 | 0.695 | 1.394 |

Subsection: Outlet Input Data
Label: Composite Outlet Structure - 1

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

| Requested Pond Water Surface Elevations | |
|---|---|
| Minimum (Headwater) | 6,922.00 ft |
| Increment (Headwater) | 0.50 ft |
| Maximum (Headwater) | 6,928.00 ft |

## Outlet Connectivity

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|
| Orifice-Circular | Orifice - 1 | Forward | TW | 6,922.00 | 6,928.00 |
| Inlet Box | Riser - 1 | Forward | Culvert - 1 | 6,925.00 | 6,928.00 |
| Culvert-Circular | Culvert - 1 | Forward | TW | 6,922.00 | 6,928.00 |
| Tailwater Settings | Tailwater | | | (N/A) | (N/A) |

Subsection: Outlet Input Data
Label: Composite Outlet Structure - 1

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

| Structure ID: Culvert - 1<br>Structure Type: Culvert-Circular | |
|---|---|
| Number of Barrels | 1 |
| Diameter | 36.0 in |
| Length | 50.00 ft |
| Length (Computed Barrel) | 50.01 ft |
| Slope (Computed) | 0.020 ft/ft |

| Outlet Control Data | |
|---|---|
| Manning's n | 0.013 |
| Ke | 0.200 |
| Kb | 0.007 |
| Kr | 0.000 |
| Convergence Tolerance | 0.00 ft |

| Inlet Control Data | |
|---|---|
| Equation Form | Form 1 |
| K | 0.0045 |
| M | 2.0000 |
| C | 0.0317 |
| Y | 0.6900 |
| T1 ratio (HW/D) | 1.085 |
| T2 ratio (HW/D) | 1.187 |
| Slope Correction Factor | -0.500 |

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

| | | | |
|---|---|---|---|
| T1 Elevation | 6,925.26 ft | T1 Flow | 42.85 ft³/s |
| T2 Elevation | 6,925.56 ft | T2 Flow | 48.97 ft³/s |

| Structure ID: Riser - 1<br>Structure Type: Inlet Box | |
|---|---|
| Number of Openings | 1 |
| Elevation | 6,925.00 ft |
| Orifice Area | 10.2 ft² |
| Orifice Coefficient | 0.600 |
| Weir Length | 4.00 ft |
| Weir Coefficient | 3.00 (ft^0.5)/s |
| K Reverse | 1.000 |
| Manning's n | 0.000 |
| Kev, Charged Riser | 0.000 |
| Weir Submergence | False |
| Orifice H to crest | False |

| Structure ID: Orifice - 1<br>Structure Type: Orifice-Circular | |
|---|---|
| Number of Openings | 5 |
| Elevation | 6,922.00 ft |
| Orifice Diameter | 0.3 in |
| Orifice Coefficient | 0.600 |

| Structure ID: TW<br>Structure Type: TW Setup, DS Channel | |
|---|---|
| Tailwater Type | Free Outfall |

| Convergence Tolerances | |
|---|---|
| Maximum Iterations | 30 |
| Tailwater Tolerance (Minimum) | 0.01 ft |
| Tailwater Tolerance (Maximum) | 0.50 ft |
| Headwater Tolerance (Minimum) | 0.01 ft |
| Headwater Tolerance (Maximum) | 0.50 ft |
| Flow Tolerance (Minimum) | 0.001 ft³/s |
| Flow Tolerance (Maximum) | 10.000 ft³/s |

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Culvert - 1 (Culvert-Circular)
---
Mannings open channel maximum capacity: 101.46 ft³/s
Upstream ID = Riser - 1 (Inlet Box)
Downstream ID = Tailwater (Pond Outfall)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6,922.00 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,922.50 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,923.00 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,923.50 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,924.00 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,924.50 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,925.00 | 0.00 | 0.00 | 0.00 | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,925.50 | 4.24 | 6,922.91 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,926.00 | 12.00 | 6,923.59 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,926.50 | 22.05 | 6,924.22 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,927.00 | 33.94 | 6,924.87 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,927.50 | 47.43 | 6,925.55 | Free Outfall | Free Outfall | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,928.00 | 62.35 | 6,926.51 | Free Outfall | Free Outfall | 0.00 | 0.01 | (N/A) | 0.00 |

| |
|---|
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| CRIT.DEPTH CONTROL Vh= .226ft Dcr= .644ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .406ft Dcr= 1.100ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .594ft Dcr= 1.510ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= .811ft Dcr= 1.892ft CRIT.DEPTH Hev= .00ft |
| CRIT.DEPTH CONTROL Vh= 1.088ft Dcr= 2.243ft CRIT.DEPTH Hev= .00ft |
| INLET CONTROL... Submerged: HW =4.51 |

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Riser - 1 (Inlet Box)

Upstream ID = (Pond Water Surface)
Downstream ID = Culvert - 1 (Culvert-Circular)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6,922.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,922.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,923.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,923.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,924.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,924.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,925.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,925.50 | 4.24 | 6,925.50 | Free Outfall | 6,922.91 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,926.00 | 12.00 | 6,926.00 | Free Outfall | 6,923.59 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,926.50 | 22.05 | 6,926.50 | Free Outfall | 6,924.22 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,927.00 | 33.94 | 6,927.00 | Free Outfall | 6,924.87 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,927.50 | 47.43 | 6,927.50 | 6,925.55 | 6,925.55 | 0.00 | 0.00 | (N/A) | 0.00 |
| 6,928.00 | 62.35 | 6,928.00 | 6,926.51 | 6,926.51 | 0.00 | 0.00 | (N/A) | 0.00 |

| |
|---|
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| WS below an invert; no flow. |
| Weir: H =0.5ft |
| Weir: H =1ft |
| Weir: H =1.5ft |
| Weir: H =2ft |
| FULLY CHARGED RISER: ADJUSTED TO WEIR: H =2.5ft |
| FULLY CHARGED RISER: ADJUSTED TO WEIR: H =3ft |

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)
---
Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

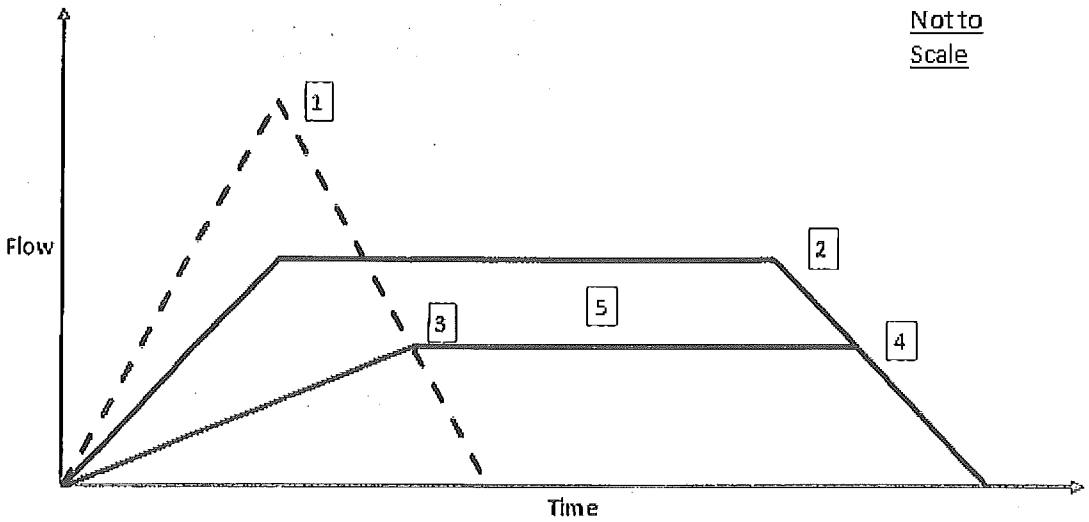
| | | | |
|---|---|---|---|
| 6,922.00 | 0.00 | (N/A) | 0.00 |
| 6,922.50 | 0.01 | (N/A) | 0.00 |
| 6,923.00 | 0.01 | (N/A) | 0.00 |
| 6,923.50 | 0.01 | (N/A) | 0.00 |
| 6,924.00 | 0.01 | (N/A) | 0.00 |
| 6,924.50 | 0.01 | (N/A) | 0.00 |
| 6,925.00 | 0.01 | (N/A) | 0.00 |
| 6,925.50 | 0.02 | (N/A) | 0.00 |
| 6,926.00 | 0.02 | (N/A) | 0.00 |
| 6,926.50 | 0.02 | (N/A) | 0.00 |
| 6,927.00 | 0.02 | (N/A) | 0.00 |
| 6,927.50 | 0.02 | (N/A) | 0.00 |
| 6,928.00 | 0.02 | (N/A) | 0.00 |

| |
|---|
| WS below an invert; no flow. |
| H =.49 |
| H =.99 |
| H =1.49 |
| H =1.99 |
| H =2.49 |
| H =2.99 |
| H =3.49 |
| H =3.99 |
| H =4.49 |
| H =4.99 |
| H =5.49 |
| H =5.99 |

Subsection: Modified Rational Graph
Label: BASIN C4&C5

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

| Method Type | Method T |
|---|---|
| Time of Duration (Modified Rational, Critical) | 0.333 hours |




| [1] | | | [2] | | |
|---|---|---|---|---|---|
| Time of Concentration (Modified Rational, Composite) | 0.280 | hours | Time of Duration (Modified Rational, Critical) | 0.333 | hours |
| Intensity (Modified Rational, Peak) | 5.872 | in/h | Intensity (Modified Rational, Critical) | 5.360 | in/h |
| Flow (Modified Rational, Peak) | 92.19 | ft³/s | Flow (Modified Rational, Critical) | 84.15 | ft³/s |

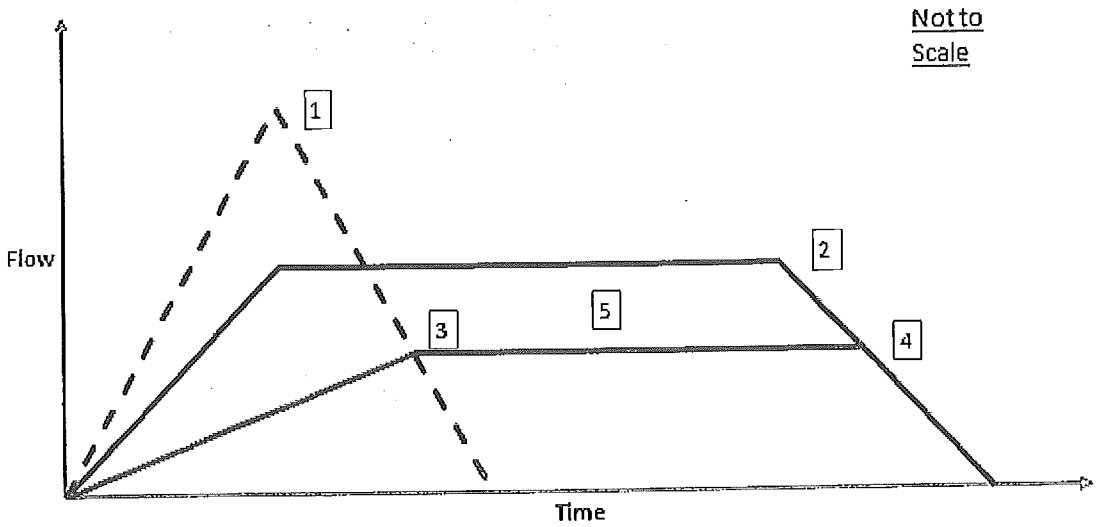
| [3] | |
|---|---|
| First Outflow Breakpoint (Modified Rational, Method T) | 0.364 hours |
| Flow (Modified Rational, Allowable) | 74.98 ft³/s |

| [4] | | | [5] | | |
|---|---|---|---|---|---|
| Second Outflow Breakpoint (Modified Rational) | 0.332 | hours | Storage (Modified Rational, Estimated) | 0.320 | ac-ft |
| Flow (Modified Rational, Allowable) | 74.98 | ft³/s | | | |

Subsection: Modified Rational Graph
Label: C6-C7

Return Event: 100 years
Storm Event: CO SPRINGS - 100 Year

| Method Type | Method T |
|---|---|
| Time of Duration (Modified Rational, Critical) | 0.250 hours |




| [1] | | | [2] | | |
|---|---|---|---|---|---|
| Time of Concentration (Modified Rational, Composite) | 0.218 | hours | Time of Duration (Modified Rational, Critical) | 0.250 | hours |
| Intensity (Modified Rational, Peak) | 6.594 | in/h | Intensity (Modified Rational, Critical) | 6.160 | in/h |
| Flow (Modified Rational, Peak) | 31.50 | ft³/s | Flow (Modified Rational, Critical) | 29.43 | ft³/s |

| [3] | |
|---|---|
| First Outflow Breakpoint (Modified Rational, Method T) | 0.283 hours |
| Flow (Modified Rational, Allowable) | 25.00 ft³/s |

| [4] | | | [5] | | |
|---|---|---|---|---|---|
| Second Outflow Breakpoint (Modified Rational) | 0.263 | hours | Storage (Modified Rational, Estimated) | 0.104 | ac-ft |
| Flow (Modified Rational, Allowable) | 25.00 | ft³/s | | | |

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# WATER RESOURCES & WASTEWATER REPORT

## For

## Waterbury Preliminary Plan

**April 2013**

JDS-HYDRO CONSULTANTS, INC.

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