PRELIMINARY & FINAL DRAINAGE REPORT
FOR
FOREST LAKES FILINGS 2A & 2B

March 2016

Prepared for:
FOREST LAKES RESIDENTIAL DEVELOPMENT,LLC
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Job no. 1175.02

CLASSIC CONSULTING ENGINEERS & SURVEYORS

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 El Paso County for drainage reports and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors, or omissions on my part in preparing this report.

Kyle R Campbell, Colorado P.E. #29794 — Date: 8-2-14

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: Forest Lakes Residential Development, LLC

By:

Title: MANAGING MEMBER

Address: 6385 Corporate Drive, Suite 200

Colorado Springs, CO 80919

EL PASO COUNTY ONLY:

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 and 2, El Paso County Engineering Criteria Manual and Land Development Code as amended.

Jennifer Irvine, P.E. — Date: 8 AUG 2014
County Engineer / ECM Administrator

Conditions:

PRELIMINARY & FINAL DRAINAGE REPORT FOR FOREST LAKES FILINGS 2A & 2B

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CLASSIC CONSULTING ENGINEERS & SURVEYORS

PURPOSE

This document is the Preliminary and Final Drainage Report for Forest Lakes Filings 2A & 2B. The purpose of this report is to identify onsite and offsite drainage patterns, storm sewer, inlet locations, and areas tributary to the site, and to safely route developed storm water runoff to adequate outfall facilities. The proposed development shall be in adherence to the El Paso County approved Master Development Drainage Plan for Forest Lakes as well as current County Drainage Criteria.

GENERAL DESCRIPTION

Forest Lakes Filings 2A & 2B are a part of the approved Planned Urban Development (PUD) for Forest Lakes. An amendment to this approved PUD is being processed concurrently with this report to match the proposed site layout. Both Filings 2A & 2B consist of public residential roadways with single-family home lots and are of 17.10 acres and 31.09 acres respectively. The proposed Filings are located southwest of Forest Lakes Drive (Filing No. 1 continuation of Baptist Road) within El Paso County limits of the State of Colorado. Both Filings will also be platted concurrently with this Drainage Report. Storm water detention and water quality are planned within the two proposed ponds proposed within the project area. All of the improvements for the storm water system will be owned and maintained by the Forest Lakes Metropolitan District.

Forest Lakes Filings 2A is the southern of these two subdivisions while both Filings are bound along the north/east by existing Forest Lakes Drive (Filing No. 1) with unplatted land located on the other side of the roadway. The site is bound to the west by Bristlecone Lake, and to the south by undeveloped land belonging to the Forest Lakes Metropolitan District and the very large Dellacroce Ranch parcel. Pinon Lake is located within the center of the proposed development, with proposed home lots encompassing all but the southern perimeter of the existing lake. There are a total 160 single-family detached homes proposed within these two filings. The average soil condition of the proposed site reflects Hydrologic Group "B" (Jarre-Tecolote complex and Tomah-Crowfoot loamy sands) as determined by the "Soil Survey of El Paso County Area," prepared by the National Cooperative Soil Survey (see map in Appendix).

EXISTING DRAINAGE CONDITIONS

The site is located within the Beaver Creek Drainage Basin. The proposed site was included in the previously approved "Forest Lakes Master Development Drainage Plan," by Kiowa Engineering Corporation, last revised April 11, 2002. However, not enough information about existing drainage conditions and outfall rates to downstream facilities was included. Therefore, a detailed existing conditions analysis was completed below.

Design Point 1 (Q_5 = 22.6 cfs, Q_{100}= 165.8 cfs) corresponds with Basin BC 1240 (OS-A in FDR) from the previously approved MDDP and "Preliminary and Final Drainage Report Forest Lakes Subdivision Filing No. 1," by Kiowa Engineering Corporation, filed September 8, 2004. This off-site basin is approximately 213.78 acres of existing large lot (5 acre) single-family homes and residential roadways that drains onto the overall Forest Lakes boundary, specifically a future school site on Basin OS-B. The time of concentration, area, and subsequent runoff rates were taken from the previously approved reports. No further study on this off-site basin/runoff was completed with this report. This runoff continues through Basin OS-B and drains to existing Type D grated inlets located north of Forest Lakes Drive at Design Point 2. Per the previous report, the runoff rate from this Basin was 22 cfs (5-year) and 150 cfs (100-yr). However, this analysis uses the slightly higher calculated flow rates listed above (Q_5 = 22.6 cfs, Q_{100}= 165.8 cfs) to provide a more conservative storm sewer system design.

Design Point 2 (Q_5 = 23.2 cfs, Q_{100}= 170.5 cfs) corresponds with BC 1240 & BC-1 from the MDDP and Filing 1 Drainage Reports. Four existing Type D grated inlets are located at this design point to intercept the combined runoff from Design Point 1 and Basin OS-B, 6.09 acres of undeveloped land (future school site). The combined runoff is conveyed under Forest Lakes Drive via an existing 48" RCP storm sewer (Pipe 1). Any future development within Basins OS-A or OS-B is required to provide its own detention and storm water quality prior to releasing into this existing 48" storm pipe.

Design Point 3 (Q_5 = 3.5 cfs, Q_{100}= 8.4 cfs) consists of runoff from Basin EX-A, 2.51 acres of existing Forest Lakes Drive and adjacent undeveloped and landscaped land to the north. An existing 5' Type-R sump inlet intercepts the entirety of this runoff and an existing 18" RCP (Pipe 2) conveys the runoff to the inlet on the opposite side of Forest Lakes Drive at DP-4. The inlets and storm pipes within this portion of

Forest Lakes Drive were installed as a part of the Forest Lakes Filing No. 1 development. The emergency route for this low point is to overtop the crown of the road and drain south down proposed Long Valley Drive.

Design Point 4 (Q_5 = 0.6 cfs, Q_{100}= 1.1 cfs) consists of runoff from Basin EX-B, 0.16 acres of existing Forest Lakes Drive. An existing 5' Type-R sump inlet intercepts this runoff and an existing 18" RCP (Pipe 3) conveys the combined runoff from this inlet and DP-3 to the 48" main (Pipe 4). The existing 48" Pipe 4 contains a runoff rate of Q_5 = 25 cfs and Q_{100}= 174 cfs and drains to the south toward the proposed Filing 2B development.

Design Point 5 (Q_5 = 3.3 cfs, Q_{100}= 9.3 cfs) consists of runoff from Basin EX-C, 2.76 acres of existing Forest Lakes Drive and undeveloped land to the south. An existing 15' Type-R at-grade inlet intercepts a portion of this runoff (Q_5 = 3.2 cfs and Q_{100}= 6.8 cfs) and an existing 18" RCP (Pipe 5) conveys it to the aforementioned 48" main. The existing 48" Pipe 6 contains a combined runoff rate of Q_5 = 26 cfs and Q_{100}= 177 cfs and currently daylights within the proposed Filing 2B parcel (Basin EX-E). This runoff continues into Pinon Lake without detention or water quality treatment as originally approved with the Filing No. 1 development and drainage plan. The runoff not intercepted by this existing at-grade inlet continues onto the proposed site and drains to Design Point 8.

Design Point 6 (Q_5 = 29.8 cfs, Q_{100}= 192.4 cfs) consists of the runoff from Pipe 6, Pipe 15 (See Design Point 12) and that from Basin EX-E, 13.10 acres of the undeveloped proposed site (Filing 2B). There have been grading activities (fill placement) within Basin EX-E with the recent construction of Forest Lakes Filing No. 3. With this activity a temporary sediment basin has been constructed at this Design Point that was not previously constructed. This temporary sediment basin has an 8" standpipe and outfall that slowly releases to the existing Pinon Lake. Large storm events will likely overtop the facility and drain directly into the lake as has been the case in the historic conditions of the area.

Design Point 7 (Q_5 = 30.7 cfs, Q_{100}= 199.0 cfs) consists of the runoff from Design Point 6 and that from Basin EX-H, 8.48 acres of the undeveloped proposed site (Filing 2B) that drains directly into Pinon Lake. This runoff rate serves as a comparison point for the developed release into existing Pinon Lake.

Design Point 8 (Q_5 = 3.9 cfs, Q_{100}= 30.1 cfs) consists of the runoff not intercepted at DP-5 and the runoff from Basin EX-D, 13.53 acres of the undeveloped proposed site (Filing 2B) and directly tributary off-site area that drains directly south along the western boundary into the Bristlecone Lake spillway rundown. This runoff rate serves as a comparison point for the developed release to this same outfall corridor for the Bristlecone Lake spillway.

Design Point 9 (Q_5 = 3.2 cfs, Q_{100}= 23.8 cfs) consists of the runoff from Basin EX-G, 11.34 acres of the undeveloped proposed site (Filing 2A) that drains directly onto the adjacent Dellacroce Ranch to the south. This runoff rate serves as a comparison point for the developed release onto the adjacent parcel. The limits of Basin EX-G match the basin limits as shown by the previously approved report, "Final Drainage Report for Baptist Road West, El Paso County, CO," by Felsburg Holt & Ullevig, dated March 19, 2015.

Design Point 11 (Q_5 = 4.3 cfs, Q_{100}= 10.8 cfs) consists of runoff from Basin EX-I, 2.58 acres of existing Forest Lakes Drive and adjacent undeveloped and landscaped land to the north. An existing 5' Type-R sump inlet intercepts the entirety of this runoff and an existing 18" RCP (Pipe 14) conveys the runoff to the inlet on the opposite side of Forest Lakes Drive at DP-15. The inlets and storm pipes within this portion of Forest Lakes Drive were installed as a part of the Forest Lakes Filing No. 1 development and modified with the amendment to Forest Lakes Drive (installation of curb and gutter). The emergency route for this low point is to overtop the crown of the road and the southern curb/low point at DP-12, continuing onto the proposed development and Basin EX-E.

Design Point 12 (Q_5 = 3.7 cfs, Q_{100}= 7.8 cfs) consists of runoff from Basin EX-J, 1.49 acres of existing Forest Lakes Drive. An existing 5' Type-R sump inlet intercepts this runoff and an existing 24" RCP (Pipe 15) conveys the combined runoff from this inlet and DP-11 directly south, day lighting onto the proposed site and Basin EX-E. The existing 24" Pipe 15 contains a runoff rate of Q_5 = 8 cfs and Q_{100}= 18 cfs which combines at the previously discussed temporary sediment basin (Design Point 6) prior to draining into Pinon Lake.

Design Point 24 (Q_5 = 0.9 cfs, Q_{100}= 6.6 cfs) consists of runoff from Basin EX-AA, 3.21 acres of undeveloped land north of existing Forest Lakes Drive. An existing Type-D grated inlet intercepts this runoff and an existing 18" RCP (Pipe 7) drains to the south into the inlet at Design Point 25. This design

point and the existing storm system and runoff discussed within Design Points 25 thru 28 correspond directly to the recently approved "Drainage Report Amendment for Preliminary and Final Drainage Report Forest Lakes Subdivision Filing No. 1," by Classic Consulting Engineers & Surveyors, LLC, dated August 2015. This area is included in this report to adequately quantify the existing and developed runoff rate released to the downstream storm sewer that was recently installed and designed as a part of the "Final Drainage Report for Baptist Road West, El Paso County, CO," by Felsburg Holt & Ullevig, dated March 19, 2015.

Design Point 25 (Q_5 = 6.9 cfs, Q_{100}= 15.4 cfs) consists of runoff from Basin EX-BB, 3.24 acres of existing Forest Lakes Drive. An existing 15' Type-R at-grade inlet intercepts a portion of this runoff (Q_5 = 5.1 cfs and Q_{100}= 9.4 cfs) and an existing 18" RCP (Pipe 8) conveys the combined runoff from this inlet and DP-24 to the at-grade inlet on the opposite side of Forest Lakes Drive (Design Point 26). Pipe 8 contains a combined runoff rate of Q_5 = 5 cfs and Q_{100}= 14 cfs. The runoff not intercepted by this inlet continues south to the existing at-grade inlet at Design Point 27.

Design Point 26-EX (Q_5 = 8.1 cfs, Q_{100}= 16.1 cfs) consists of runoff from Basin EX-CC, 2.87 acres of existing Forest Lakes Drive. An existing 15' Type-R at-grade inlet intercepts a portion of this runoff (Q_5 = 6.0 cfs and Q_{100}= 9.9 cfs) and an existing 24" RCP (Pipe 9) conveys the combined runoff from this inlet and Pipe 8 toward the south. Pipe 9 contains a combined runoff rate of Q_5 = 10 cfs and Q_{100}= 22 cfs. The runoff not intercepted by this inlet continues south to the existing at-grade inlet at Design Point 28.

Design Point 27 (Q_5 = 1.8 cfs, Q_{100}= 6.0 cfs) consists of the runoff not intercepted by the at-grade inlet at DP-25. An existing 15' at-grade inlet at this design point intercepts the majority of this runoff and an existing 18" RCP (Pipe 10) conveys the intercepted water to the at-grade inlet on the opposite side of Forest Lakes Drive. The runoff not intercepted by this inlet continues south onto existing Baptist Road.

Design Point 28 (Q_5 = 2.1 cfs, Q_{100}= 6.3 cfs) consists of the runoff not intercepted by the at-grade inlet at DP-26. An existing 15' at-grade inlet at this design point intercepts the majority of this runoff and an existing 18" RCP conveys to the main from north, Pipe 11. Pipe 11 is an existing 24" main containing a combined runoff rate of Q_5 = 13 cfs and Q_{100}= 30 cfs and connects to the existing El Paso County storm

system recently installed with the Baptist Road improvements. The runoff not intercepted by this inlet continues south to the existing Type-D grated inlet at Design Point 29.

Design Point 29-EX (Q_5 = 1.4 cfs, Q_{100}= 11.0 cfs) consists of the flow-by from DP-28 and the runoff from Basin EX-F, 6.10 acres of undeveloped proposed site (Filing 2A) and a portion of a Forest Lakes Metropolitan District owned parcel, including the existing sanitary sewer pump station. An existing Type D grated inlet intercepts this runoff and the downstream existing storm system was installed and designed with the previously mentioned Baptist Road improvements and the "Final Drainage Report for Baptist Road West, El Paso County, CO," by Felsburg Holt & Ullevig (FHU), dated March 19, 2015. The tributary basins to this design point have been shown to match that of this previously approved report. This runoff is conveyed by an existing 24" RCP storm pipe to a connection manhole with Pipe 11 from the Forest Lakes Drive roadway improvements. Pipe 13 represents the existing 24" outfall pipe from this junction manhole and contains a calculated existing conditions runoff rate of Q_5 = 11.8 cfs and Q_{100}= 34.7 cfs. Per the FHU Baptist Road study, the runoff rate within this Pipe 13 was found to be Q_5 = 6 cfs and Q_{100}= 24 cfs. The runoff rate discrepancy is due to the difference in tributary area concluded by each of the two studies, specifically Basin EX-AA (Design Point 24), and a different time of concentration calculation.

PROPOSED DRAINAGE CONDITIONS

A Developed Conditions Drainage Map is included in the appendix of this report for the complete development of Filings 2A & 2B. At no times is the developed runoff on the street surface higher than the El Paso County allowable criteria in the minor and major storm events. A detailed description of the developed flows for Forest Lakes Filings 2A & 2B is as follows: Drainage from individual lots is assumed to travel in side-lot swales to the street.

Design Point 1 (Q_5 = 22.6 cfs, Q_{100}= 165.8 cfs) corresponds with Design Point 1 from the Existing Conditions portion of this report.

Design Point 2 (Q_5 = 23.2 cfs, Q_{100}= 170.5 cfs) corresponds with Design Point 2 from the Existing Conditions portion of this report.

Design Point 3 (Q_5 = 3.5 cfs, Q_{100}= 8.4 cfs) corresponds with Design Point 3 of the Existing Conditions portion and consists of runoff from Basin A, 2.51 acres of existing Forest Lakes Drive and adjacent undeveloped and landscaped land to the north.

Design Point 4 (Q_5 = 0.6 cfs, Q_{100}= 1.1 cfs) consists of runoff from Basin B and also directly corresponds with Design Point 4 in the Existing Conditions portion of this report. The existing 48" Pipe 4 contains a runoff rate of Q_5 = 25 cfs and Q_{100}= 174 cfs and drains to the south toward the proposed Filing 2B development.

Design Point 5 (Q_5 = 3.3 cfs, Q_{100}= 9.3 cfs) consists of runoff from Basin C, 2.76 acres of existing Forest Lakes Drive and undeveloped land to the south. An existing 15' Type-R at-grade inlet intercepts a portion of this runoff (Q_5 = 3.2 cfs and Q_{100}= 6.8 cfs) and an existing 18" RCP (Pipe 5) conveys it to the aforementioned 48" main. The existing 48" Pipe 6 contains a combined runoff rate of Q_5 = 26 cfs and Q_{100}= 177 cfs and is proposed to be extended within Long Valley Drive and a landscaped tract directly to existing Pinon Lake. This runoff outfall into Pinon Lake without detention or water quality treatment as originally approved with the Filing No. 1 development and drainage plan. The runoff not intercepted by this existing at-grade inlet continues onto the proposed site and drains to Design Point 6. Riprap protection will be installed at the exit of the 48" RCP into Pinon Lake.

Design Point 6 (Q_5 = 5.2 cfs, Q_{100}= 14.3 cfs) consists of runoff from Basin D, 3.37 acres of a proposed single family lots and a portion of Long Valley Drive. A proposed 5' Type R sump inlet will intercept the entirety of this runoff and a 24" RCP (Pipe 7) will convey to the sump inlet on the opposite side of the road, Design Point 7. The emergency route for this low point is to overtop the crown and high point at the Long Valley Drive and Lakes Edge Drive intersection.

Design Point 7 (Q_5 = 6.5 cfs, Q_{100}= 13.3 cfs) consists of runoff from Basin E, 2.78 acres of proposed lots, Long Valley Drive, and landscaped tracts that drain down Long Valley Drive to the proposed 5' Type R inlet. A 30" RCP (Pipe 8) conveys the combined runoff from Pipe 7 and this inlet to the north-east down Lakes Edge Drive toward the detention/water quality pond at Design Point 15. The emergency overflow route is the same high point as described at DP-6.

Design Point 8 (Q_5 = 0.6 cfs, Q_{100}= 2.2 cfs) consists of runoff from Basin F, 0.59 acres of proposed lots and landscaped tract. A proposed Type D grated inlet will intercept this runoff prior to draining onto Lakes Edge Drive. A proposed 18" RCP (Pipe 9) conveys to the 30" main from DP-7. The combined runoff at this junction manhole of Pipes 8 & 9 is conveyed downstream by a 30" RCP (Pipe 10) carrying a total runoff rate of Q_5 = 11.1 cfs and Q_{100}= 27.1 cfs. The emergency overflow route for this low point within the landscaped tract is to overtop the adjacent walk and drain onto Lakes Edge Drive.

Design Point 9 (Q_5 = 7.6 cfs, Q_{100}= 15.8 cfs) consists of runoff from Basin G, 3.49 acres of proposed single family lots and portions of Lakes Edge Drive and Lake Mist Drive. A proposed 10' Type R sump inlet will intercept the entirety of this runoff and a 24" RCP (Pipe 11) will convey to the storm main within Lakes Edge Drive. The emergency route for this low point is to overtop the crown of the road and the southern curb line and drain directly into the proposed detention/water quality facility at DP-15.

Design Point 10 (Q_5 = 1.8 cfs, Q_{100}= 3.5 cfs) consists of runoff from Basin H, 0.60 acres of proposed single family lots and a portion of Lakes Edge Drive. A proposed 5' Type R sump inlet will intercept the entirety of this runoff and an 18" RCP (Pipe 12) will convey to the storm main within Lakes Edge Drive. Pipe 13 represents this 36" storm main after the connection of Pipes 11 & 12 and contains a total runoff rate of Q_5 = 18.8 cfs and Q_{100}= 42.5 cfs. The emergency route for this low point is to overtop the southern curb line and drain directly into the proposed detention/water quality facility at DP-15.

Design Point 11 (Q_5 = 4.3 cfs, Q_{100}= 10.8 cfs) consists of runoff from Basin I, 2.58 acres of existing Forest Lakes Drive and adjacent undeveloped and landscaped land to the north and corresponds directly with Design Point 11 of the Existing Conditions portion of this report. The emergency route for this low point is to overtop the crown of the road and the drain down proposed Channel Island Drive.

Design Point 12 (Q_5 = 2.2 cfs, Q_{100}= 4.9 cfs) consists of runoff from Basin J, 0.99 acres of existing Forest Lakes Drive. An existing 5' Type-R sump inlet intercepts this runoff and an existing 24" RCP (Pipe 15) conveys the combined runoff from this inlet and DP-11 directly south, day lighting in the existing conditions onto the proposed site. This 24" will be extended around the proposed home lots and continue south within the residential roadways toward the proposed detention pond 'A'.

Design Point 13 (Q_5 = 11.3 cfs, Q_{100}= 25.9 cfs) consists of runoff from Basin K, 6.58 acres of proposed single family lots and portions of Forest Lakes Drive, Channel Island Drive, and Lake Mist Drive. A proposed 15' Type R sump inlet will intercept the entirety of this runoff and a 30" RCP (Pipe 16) will convey toward the proposed pond to the south. The emergency route for this low point is to overtop the crown of the road and the southern curb line and drain directly into the proposed detention/water quality facility at DP-15.

Design Point 14 (Q_5 = 2.6 cfs, Q_{100}= 5.2 cfs) consists of runoff from Basin L, 0.97 acres of proposed single family lots and a portion of Lake Mist Drive. A proposed 5' Type R sump inlet will intercept the entirety of this runoff and a 24" RCP (Pipe 17a) will convey toward a junction manhole with the aforementioned Pipes 13 and 15. Pipe 17b represents this 30" storm main after the connection of Pipe 16 from across Lake Mist Drive. Pipe 17b contains a total runoff rate of Q_5 = 13.8 cfs and Q_{100}= 30.6 cfs. The emergency route for this low point is to overtop the southern curb line and drain directly into the proposed detention/water quality facility at DP-15. Pipes 17b, 13, and 15 combine at a proposed Type 1 manhole prior to discharging into the proposed detention/water quality facility. Pipe 18 (42" RCP) represents this outfall main and contains a total runoff rate of Q_5 = 36.0 cfs and Q_{100}= 81.7 cfs. This 42" RCP drains onto a concrete bottom forebay within the facility.

Design Point 15 (Q_5 = 36.2 cfs, Q_{100}= 83.5 cfs) consists of the total runoff into the proposed Detention/ Storm Water Quality Facility 'A'. The runoff is from the previously discussed 42" RCP Pipe 18 and from Basin M, 0.87 acres of the detention pond itself and adjacent slope area. As with the Filing No. 1 detention facilities, this proposed Full Spectrum Extended Detention/Water Quality Facility per the Urban Drainage and Flood Control District (UDFCD) will be owned and maintained by the Forest Lakes Metropolitan District. The facility sizing spreadsheet is located in the Appendix of this report, along with pond volume calculations, and pond modeling results via Bentley PondPack Version 8.

A tributary area of 22.82 acres at a composite 55.9% imperviousness was used in determining the Excess Urban Runoff Volume (EURV) of 1.40 acre-feet. This volume is established in the proposed pond under the top of the outlet box opening elevation 6857.85 (within the orifice plate of the outlet box). A concrete bottomed forebay with an 18" high retaining wall and a 7" notch out of the far end will be installed at the Pipe 18 entry point into the facility. A 5' wide concrete trickle channel with 6" curb heads at a 1% grade will

be installed down the center of the basin to convey the low flows to the outlet box and limit erosion within the bottom of the facility.

The bottom of the detention basin is at an elevation of 6851.50 with a EURV provided at elevation 6857.85. A 12' wide outlet box (4' deep opening) is proposed with at top of box elevation at 6857.85. For a Full Spectrum Facility, the outlet box orifice holes within the front plate is to drain the EURV in 72 hours, resulting in the necessary orifice hole sizing of 1 column of 15/16" diameter circular holes (19 rows, 4" on center spacing). A 2.5' deep concrete micropool is to be installed within the wingwalls and outlet box. A removable trash screen of 12" in width will be placed in front of the orifice plate to help prevent the orifice holes from clogging. A 30" RCP outlet Pipe 19 will convey the detained release (Q_5 = 0.7 cfs, Q_{100}= 36.0 cfs) to the adjacent existing Pinon Lake. A riprap pad will be installed at the 30" exit to prevent erosion. A 28' length emergency spillway located at elevation 6859.00 will pass the entire incoming 100-year storm event (83.5 cfs) at a flood depth less than 1.0'. Per the current El Paso County Drainage Criteria Manual (DCM), the top of the pond berm shall be 2.0' higher than the flood depth water surface elevation, in this case at 6862.00. This emergency spillway will only be utilized in case of complete outlet box failure and will be constructed of riprap rock buried under 6" of topsoil and revegetated. This facility adequately treats the developed runoff from Forest Lakes Filing 2B and detains the release to below historic rates into Pinon Lake (See Design Point 16).

Design Point 16 (Q_5 = 28.5 cfs, Q_{100}= 196.7 cfs) consists of the combined runoff into the existing Pinon Lake; Pipe 6 (48" RCP) carrying the by-pass flow, plus Pipe 19 carrying the detained release from the Detention Facility A, and Basins W and X. Basin W is 2.25 acres consisting of back yards from the proposed home lots (Filing 2B), whereas Basin X is 3.55 acres of back yards within both Filings 2A & 2B that drain directly into the existing Pinon Lake. This runoff rate serves as a comparison point to the existing conditions release into existing Pinon Lake of Q_5 = 30.7 cfs and Q_{100}= 199.0 cfs. The developed release into Pinon Lake is less than the historic, therefore the proposed detention facility A and Filing 2B is in adherence to the County DCM.

Design Point 17 (Q_5 = 5.2 cfs, Q_{100}= 10.5 cfs) consists of runoff from Basin R, 2.14 acres of proposed single family lots (Filing 2A) and a portion of Blue Pearl Court. A proposed 5' Type R sump inlet will intercept the entirety of this runoff and an 18" RCP (Pipe 20) will convey to the sump inlet on the opposite

side of Blue Pearl Court (Design Point 18). The emergency route for this low point is to overtop the crown of the road and the curb return to the north at Blue Pearl Court and Pelican Bay Drive. This runoff would then continue east within Pelican Bay Drive to Design Point 22.

Design Point 18 (Q_5 = 1.8 cfs, Q_{100}= 3.6 cfs) consists of runoff from Basin S, 0.64 acres of proposed single family lots (Filing 2A) and a portion of Blue Pearl Court. A proposed 5' Type R sump inlet will intercept the entirety of this runoff and a 24" RCP (Pipe 21) will convey the combined runoff from Design Points 17 & 18 to the east within Pelican Bay Drive toward the proposed pond and Forest Lakes Drive. The emergency route for this low point is to overtop the curb return to the north at Blue Pearl Court and Pelican Bay Drive. This runoff would then continue east within Pelican Bay Drive to Design Point 22. Pipe 21 contains a combined runoff rate of Q_5 = 6.9 cfs and Q_{100}= 13.8 cfs.

Design Point 19 (Q_5 = 3.8 cfs, Q_{100}= 8.2 cfs) consists of runoff from Basin Q, 1.68 acres of proposed single family lots (Filing 2A) and a portion of Blue Pearl Court and Pelican Bay Drive. A proposed 10' Type R at-grade inlet will intercept the majority of this runoff and an 18" RCP (Pipe 22) will convey the intercepted runoff to the 24" main from DP-18. The runoff not intercepted by this inlet (Q_5 = 1.0 cfs and Q_{100}= 3.1 cfs) continues along Pelican Bay Drive to the sump inlet at Design Point 21. Pipe 23 represents the 24" main within Pelican Bay Drive after the connection of Pipe 22 and contains a runoff rate of Q_5 = 9.6 cfs and Q_{100}= 18.6 cfs.

Design Point 20 (Q_5 = 4.8 cfs, Q_{100}= 10.9 cfs) consists of runoff from Basin N, 2.46 acres of existing Forest Lakes Drive and adjacent landscaped/undeveloped area tributary to the roadway. Curb and gutter was recently installed along Forest Lakes Drive that routes this runoff onto proposed Pelican Bay Drive and to the sump inlet at Design Point 21. The revised routing of this runoff into the site and through the proposed detention/water quality facility enhances the existing drainage system and overall treatment and detention of developed runoff from the overall Forest Lakes development.

Design Point 21 (Q_5 = 18.1 cfs, Q_{100}= 40.3 cfs) consists of runoff from Design Point 20, flow-by from Design Point 19, and from Basin P, 6.85 acres of proposed single family lots (Filing 2A) and a large portion of Lake Mist Drive. A proposed 20' Type R sump inlet will intercept the entirety of this runoff and a 30" RCP (Pipe 24) will convey the runoff to a junction manhole within Pelican Bay Drive. The emergency route

for this low point is to overtop the curb return to the east at Pelican Bay Drive and Forest Lakes Drive. This runoff would then continue south on Forest Lakes Drive to Design Points 26 & 28.

Design Point 22 (Q_5 = 2.8 cfs, Q_{100}= 5.5 cfs) consists of runoff from Basin T, 1.02 acres of proposed single family lots (Filing 2A) and a portion of Pelican Bay Drive. A proposed 10' Type R sump inlet will intercept the entirety of this runoff and an 18" RCP (Pipe 25) will convey the runoff to a junction manhole within Pelican Bay Drive. The emergency route for this low point is to overtop the curb return to the east at Pelican Bay Drive and Forest Lakes Drive. This runoff would then continue south on Forest Lakes Drive to Design Points 26 & 28. This inlet is oversized due to the potential of runoff overtopping the crown of the road from Design Point 21. The junction manhole within Pelican Bay Drive combines the runoff from Pipes 23, 24, and 25 and a 36" RCP (Pipe 26) outfalls into the proposed Detention/Water Quality Facility 'B' at Design Point 23. The combined runoff rate within Pipe 26 is Q_5 = 29.1 cfs and Q_{100}= 61.8 cfs.

Design Point 23 (Q_5 = 30.3 cfs, Q_{100}= 66.7 cfs) consists of the total runoff into the proposed Detention/ Storm Water Quality Facility 'B'. The runoff is from the previously discussed 36" RCP Pipe 26 and from Basin U, 2.03 acres of the detention pond itself and adjacent single family home lots. This proposed Full Spectrum Extended Detention/Water Quality Facility per the Urban Drainage and Flood Control District (UDFCD) will be owned and maintained by the Forest Lakes Metropolitan District. The facility sizing spreadsheet is located in the Appendix of this report, along with pond volume calculations, and pond modeling results via Bentley PondPack Version 8.

A tributary area of 16.82 acres at a composite 60.6% imperviousness was used in determining the Excess Urban Runoff Volume (EURV) of 1.13 acre-feet. This volume is established in the proposed pond under the top of the outlet box opening elevation 6832.10 (within the orifice plate of the outlet box). A concrete bottomed forebay with an 18" high retaining wall and a 6.2" notch out of the far end will be installed at the Pipe 26 entry point into the facility. A 5' wide concrete trickle channel with 6" curb heads at a 0.75% grade will be installed down the center of the basin to convey the low flows to the outlet box and limit erosion within the bottom of the facility.

The bottom of the detention basin is at an elevation of 6827.60 with a EURV provided at elevation 6832.10. A 6' wide outlet box (4' deep opening) is proposed with at top of box elevation at 6827.60. For a Full Spectrum Facility, the outlet box orifice holes within the front plate is to drain the EURV in 72 hours, resulting in the necessary orifice hole sizing of 1 column of 1" diameter circular holes (13 rows, 4" on center spacing). A 2.5' deep concrete micropool is to be installed within the wingwalls and outlet box. A removable trash screen of 12" in width will be placed in front of the orifice plate to help prevent the orifice holes from clogging. An 18" RCP outlet Pipe 27 will convey the detained release (Q_5 = 0.15 cfs, Q_{100}= 5.9 cfs) to the existing storm sewer installed along the Forest Lakes Drive improvements to the south. This system was installed per the "Drainage Report Amendment for Preliminary and Final Drainage Report Forest Lakes Subdivision Filing No. 1," by Classic Consulting Engineers & Surveyors, LLC, dated August 2015 and has adequate capacity for the addition of the proposed pond release. A 22' length emergency spillway located at elevation 6833.00 will pass the entire incoming 100-year storm event (66.7 cfs) at a flood depth less than 1.0'. The spillway will be located such that any overtopping will drain onto existing Forest Lakes Drive. Per the current El Paso County Drainage Criteria Manual (DCM), the top of the pond berm shall be 2.0' higher than the flood depth water surface elevation, in this case at 6836.00. This emergency spillway will only be utilized in case of complete outlet box failure and will be constructed of riprap rock buried under 6" of topsoil and revegetated. This facility adequately treats the developed runoff from Forest Lakes Filing 2A and detains the release to below historic rates to the downstream facilities (See Design Point 29).

Design Point 24 (Q_5 = 0.9 cfs, Q_{100}= 6.6 cfs) consists of runoff from Basin AA and is the same as described in the Existing Conditions section of this report.

Design Point 25 (Q_5 = 6.9 cfs, Q_{100}= 15.4 cfs) consists of runoff from Basin BB, 3.24 acres of existing Forest Lakes Drive and is also as described in the Existing Conditions section of this report. Pipe 29 contains a combined runoff rate of Q_5 = 5 cfs and Q_{100}= 14 cfs. The runoff not intercepted by this inlet continues south to the existing at-grade inlet at Design Point 27.

Design Point 26-DEV (Q_5 = 3.6 cfs, Q_{100}= 6.8 cfs) consists of runoff from Basin CC, 0.93 acres of existing Forest Lakes Drive. This basin/design point differs from the existing conditions due to the proposed Pelican Bay Drive roadway intercepting a portion of the Forest Lakes Drive runoff. An existing

15' Type-R at-grade inlet intercepts the majority of this runoff (Q_5 = 3.3 cfs and Q_{100}= 5.1 cfs) and an existing 24" RCP (Pipe 30) conveys the combined runoff from this inlet and Pipes 27 & 29 toward the south. Pipe 30 contains a combined runoff rate of Q_5 = 7.6 cfs and Q_{100}= 22.9 cfs. The runoff not intercepted by this inlet continues south to the existing at-grade inlet at Design Point 28.

Design Point 27 (Q_5 = 1.8 cfs, Q_{100}= 6.0 cfs) consists of the runoff not intercepted by the at-grade inlet at DP-25 and is as described in the Existing Conditions section of this report. An existing 15' at-grade inlet at this design point intercepts the majority of this runoff and an existing 18" RCP (Pipe 31) conveys the intercepted water to the at-grade inlet on the opposite side of Forest Lakes Drive. The runoff not intercepted by this inlet continues south onto existing Baptist Road.

Design Point 28 (Q_5 = 0.3 cfs, Q_{100}= 1.7 cfs) consists of the runoff not intercepted by the at-grade inlet at DP-26. An existing 15' at-grade inlet at this design point intercepts all of this runoff and an existing 18" RCP conveys to the main from north, Pipe 32. Pipe 32 is an existing 24" main containing a combined runoff rate of Q_5 = 9.3 cfs and Q_{100}= 27.7 cfs (less than in the existing conditions) and connects to the existing El Paso County storm system recently installed with the Baptist Road improvements. The runoff not intercepted by this inlet continues south to the existing Type-D grated inlet at Design Point 29.

Design Point 29-DEV (Q_5 = 0.6 cfs, Q_{100}= 4.2 cfs) consists of the runoff from Basin DD, 2.00 acres of a portion of the Forest Lakes Metropolitan District owned parcel, including the existing sanitary sewer pump station. The existing Type D grated inlet located at this Design Point intercepts the runoff. As discussed in the Existing Condition section of this report, this existing Type D grated inlet and the downstream existing storm system was installed and designed with the previously mentioned Baptist Road improvements and the "Final Drainage Report for Baptist Road West, El Paso County, CO," by Felsburg Holt & Ullevig (FHU), dated March 19, 2015. The limits of Basin DD correlate to this previously approved report as well as the tributary area to the adjacent Dellacroce Ranch.

This runoff is conveyed by an existing 24" RCP storm pipe to a connection manhole with Pipe 32 from the Forest Lakes Drive roadway improvements. Pipe 34 represents the existing 24" outfall pipe from this junction manhole and contains a calculated Forest Lakes Filing 2 developed conditions runoff rate of Q_5 = 9.8 cfs and Q_{100}= 31.8 cfs. This is less than the runoff rate quantified with the Existing Conditions section

of this report of Q_5 = 11.8 cfs and Q_{100}= 34.7 cfs due to the construction of the proposed Detention Pond 'B' and release rate less than historic values.

Design Point 30 (Q_5 = 2.8 cfs, Q_{100}= 6.5 cfs) consists of runoff from Basins Y and Z. Basins Y and Z are 0.49 acres and 0.84 acres respectively of single family home lots that drain directly onto the adjacent property to the south (Dellacroce Ranch). This design point coorelates with Design Point 9 of the Existing Conditions section of this report which quantifies the historic runoff rate onto the adjacent property. The development of Forest Lakes Filing 2A substantially reduces the runoff rate to this adjacent property by truncated much of the tributary basin and routing the developed runoff into the proposed Detention/Water quality facility. The allowable or historic runoff rate onto Dellacroce Ranch from the proposed site is Q_5 = 3.2 cfs, Q_{100}= 23.8 cfs.

EROSION CONTROL PLAN

Complete construction drawings along with estimates of guaranteed funds are being concurrently submitted with this Preliminary and Final Drainage Report for Forest Lakes Filing No. 2A & 2B. All grading and erosion control is per the current El Paso County Drainage Criteria Manual and regulations.

DRAINAGE CRITERIA

Hydrologic calculations were performed using the City of Colorado Springs/El Paso County Drainage Criteria Manual, as revised in November 1991 and October 1994. Stormwater quality analysis and Extended Detention Basin (EDB) design are per the Urban Drainage and Flood Control District Manual and UD-BMP Version 3.01 spreadsheet. The Rational Method was used to estimate stormwater runoff to the proposed inlets and storm sewer pipes and for comparison purposes to the runoff rates found within the previous reports and existing conditions section of this report.

FLOODPLAIN STATEMENT

No portion of this site is located within a floodplain as determined by the Flood Insurance Rate Maps (F.I.R.M.) Map Number 08041C 0286F effective date, March 17, 1997 (See Appendix).

DRAINAGE AND BRIDGE FEES FILING NO. 2A & 2B

At this time, both Filings 2A & 2B are to be platted and are within the Beaver Creek Miscellaneous Drainage Basin. The year 2015 El Paso County Drainage fee of $8,968 per impervious acre applies (no Bridge fee is required). Filing 2A contains a total of 17.097 acres at 60.7% imperviousness, therefore fees are required on **10.378 acres (Filing 2A).** Filing 2B contains a total of 31.094 acres at 42.4% imperviousness, therefore fees are required on **13.184 acres (Filing 2B).**

FILING 2A (10.378 impervious acres)
Drainage Fee:
$8,968/acre x 10.378 acres $ 93,069.90

FILING 2B (13.184 impervious acres)
Drainage Fee:
$8,968/acre x 13.184 acres $ 118,234.11

Existing Drainage Fee credits will be utilized to offset portions of the required fees due for these two filings.

CONSTRUCTION COST OPINION

Public Drainage Facilities Non-reimbursable - FILING 2A

A complete breakdown of all proposed improvements, including the proposed storm sewer and detention ponds are also included in the concurrently submitted Estimate of Guaranteed Funds for each filing.

ITEM	DESCRIPTION	QUANTITY	UNIT COST	COST
1.	5' Type-R Inlet	2 EACH	$3,791/EA	$ 7,582.00
2.	10' Type-R Inlet	2 EACH	$5,528/EA	$ 11,056.00
3.	20' Type-R Inlet	1 EACH	$8,000/EA	$ 8,000.00
4.	Flared End Section (FES)	1 EACH	$2,200/EA	$ 2,200.00
5.	18" RCP Storm Drain	413 LF	$69/LF	$ 28,497.00
6.	24" RCP Storm Drain	910 LF	$84/LF	$ 76,440.00
7.	30" RCP Storm Drain	31 LF	$94/LF	$ 2,914.00
8.	36" RCP Storm Drain	166 LF	$124/LF	$ 20,584.00
9.	Type I Storm MH	2 EACH	$8,592/EA	$ 17,184.00
10.	Riprap protection	175 C.Y.	$98/CY	$ 17,150.00
11.	Channel Lining, Concrete	35 C.Y.	$450/CY	$ 15,750.00
12.	Detention Outlet Structure	1 EACH	$17,500/EA	$ 17,500.00
13.	Detention Emergency Spillway	1 EACH	$4,000/EA	$ 4,000.00

TOTAL **$ 228,857.00**

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Public Drainage Facilities Non-reimbursable - FILING 2B

A complete breakdown of all proposed improvements, including the proposed storm sewer and detention ponds are also included in the concurrently submitted Estimate of Guaranteed Funds for each filing.

ITEM	DESCRIPTION	QUANTITY	UNIT COST	COST
1.	5' Type-R Inlet	2 EACH	$3,791/EA	$ 7,582.00
2.	10' Type-R Inlet	3 EACH	$5,528/EA	$ 16,584.00
3.	15' Type-R Inlet	1 EACH	$8,000/EA	$ 8,000.00
4.	Type D Grate Inlet	1 EACH	$3,270/EA	$ 3,270.00
5.	Flared End Section (FES)	3 EACH	$2,200/EA	$ 6,600.00
6.	18" RCP Storm Drain	74 LF	$69/LF	$ 5,106.00
7.	24" RCP Storm Drain	399 LF	$84/LF	$ 33,516.00
8.	30" RCP Storm Drain	608 LF	$94/LF	$ 57,152.00
9.	36" RCP Storm Drain	89 LF	$124/LF	$ 11,036.00
10.	42" RCP Storm Drain	39 LF	$134/LF	$ 5,226.00
11.	48" RCP Storm Drain	840 LF	$178/LF	$ 149,520.00
12.	Type I Storm MH	6 EACH	$8,592/EA	$ 51,552.00
13.	Riprap protection	210 C.Y.	$98/CY	$ 20,580.00
14.	Channel Lining, Concrete	19 C.Y.	$450/CY	$ 8,550.00
15.	Detention Outlet Structure	1 EACH	$17,500/EA	$ 17,500.00
16.	Detention Emergency Spillway	1 EACH	$4,000/EA	$ 4,000.00
TOTAL				**$ 405,774.00**

SUMMARY

Developed runoff from the proposed Forest Lakes Filings 2A and 2B are proposed to outfall to two proposed public storm systems serving two separate detention/water quality facilities (owned and maintained by the Forest Lakes Metropolitan District) prior to discharging to downstream facilities. The proposed Full Spectrum detention/water quality ponds were sized using the current and applicable drainage criteria and provide release rates below existing allowable release rates and therefore the proposed development does not overburden downstream facilities. An existing conditions analysis was included in this report to accurately compare runoff rates at various locations of the proposed development and existing infrastructure. All drainage facilities were sized using the current El Paso County Drainage Criteria and

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Urban Drainage and Flood Control District Criteria and will safely discharge storm water runoff to adequate outfalls.

PREPARED BY:
Matthew Larson
Project Engineer

mal/117502/ForestLakes2A-2B-FDR.doc

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ENGINEERS & SURVEYORS

REFERENCES

1. City of Colorado Springs Drainage Criteria Manual Volume 1, May 2014.

2. Drainage Criteria Manual (Volume 3) latest revision April 2008, Urban Drainage and Flood Criteria District.

3. "Forest Lakes Master Development Drainage Plan," by Kiowa Engineering Corporation, revised April 11, 2002.

4. "Preliminary and Final Drainage Report Forest Lakes Subdivision Filing No. 1," by Kiowa Engineering Corporation, filed September 8, 2004.

5. "Final Drainage Report for Baptist Road West," by Felsburg Holt & Ullevig, March 19, 2015.

6. "Drainage Report Amendment for Preliminary and Final Drainage Report Forest Lakes Subdivision Filing No. 1," by Classic Consulting Engineers & Surveyors, LLC, dated August 2015.

APPENDIX

VICINITY MAP

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SOILS MAP (S.C.S SURVEY)

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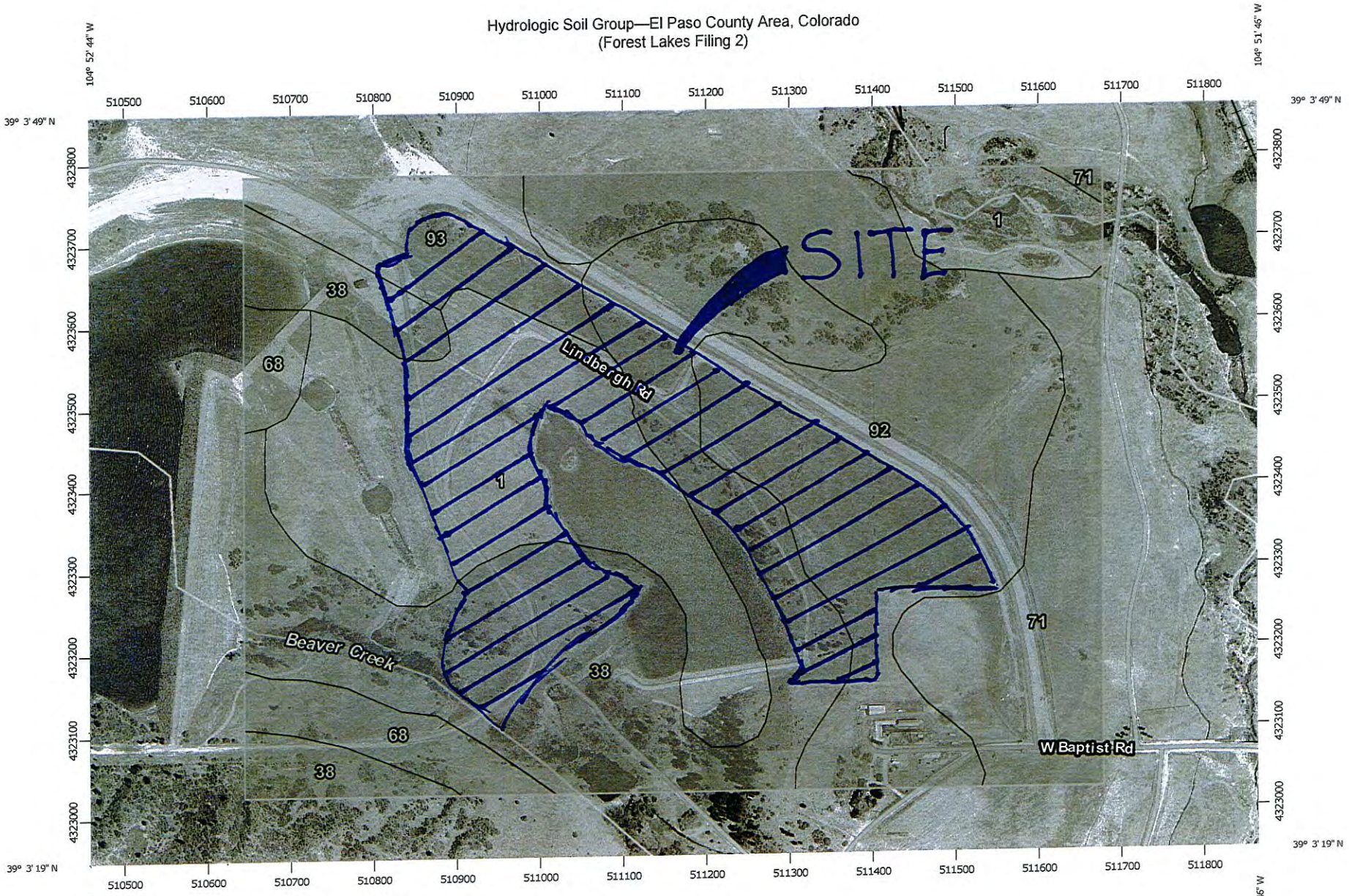
Hydrologic Soil Group—El Paso County Area, Colorado
(Forest Lakes Filing 2)



Map Scale: 1:6,430 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 300 600 1200 1800

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

USDA **Natural Resources Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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 13, Sep 22, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 15, 2011—Sep 22, 2011

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**
1	Alamosa loam, 1 to 3 percent slopes	D	45.0	23.1%
38	Jarre-Tecolote complex, 8 to 65 percent slopes	B	60.9	31.3%
68	Peyton-Pring complex, 3 to 8 percent slopes	B	8.4	4.3%
71	Pring coarse sandy loam, 3 to 8 percent slopes	B	20.0	10.3%
92	Tomah-Crowfoot loamy sands, 3 to 8 percent slopes	B	49.1	25.2%
93	Tomah-Crowfoot complex, 8 to 15 percent slopes	B	11.2	5.7%
Totals for Area of Interest			**194.7**	**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.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

F.E.M.A. MAP

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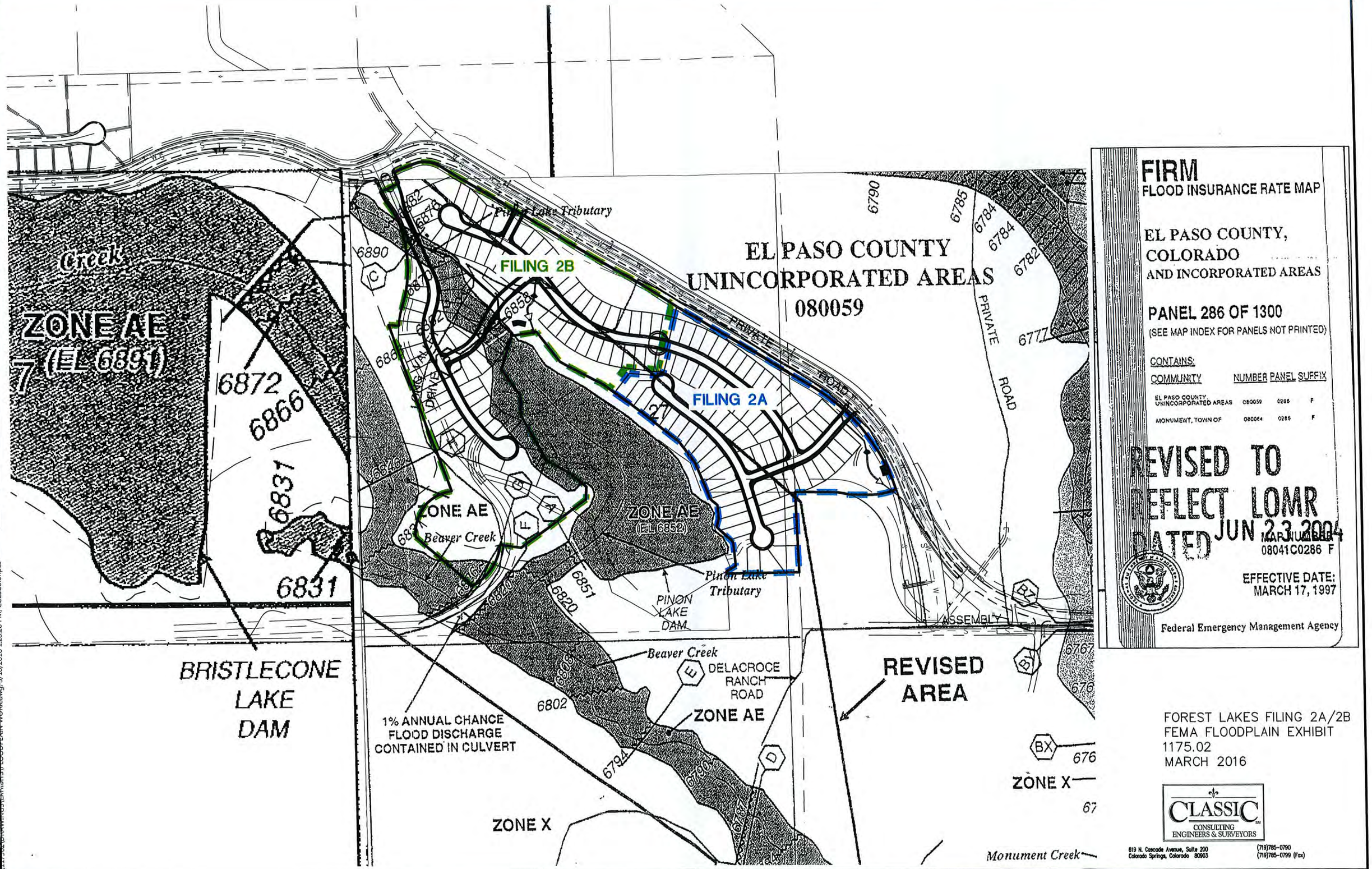
FILING 2B
FILING 2A
EL PASO COUNTY
UNINCORPORATED AREAS
080059
ZONE AE
(EL 6891)
ZONE AE
(EL 6852)
ZONE AE
ZONE X
ZONE X
Pinon Lake Tributary
Beaver Creek
Beaver Creek
Monument Creek
PINON LAKE DAM
BRISTLECONE LAKE DAM
DELACROCE RANCH ROAD
PRIVATE ROAD
ASSEMBLY
REVISED AREA
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT
6890
6872
6866
6831
6858
6846
6820
6851
6806
6802
6794
6790
6785
6784
6784
6782
6777
6767
676
67
FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO
AND INCORPORATED AREAS
PANEL 286 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
EL PASO COUNTY, UNINCORPORATED AREAS 080059 0286 F
MONUMENT, TOWN OF 080064 0285 F
REVISED TO REFLECT LOMR DATED JUN 23 2004
MAP NUMBER
08041C0286 F
EFFECTIVE DATE:
MARCH 17, 1997
Federal Emergency Management Agency
FOREST LAKES FILING 2A/2B
FEMA FLOODPLAIN EXHIBIT
1175.02
MARCH 2016
CLASSIC CONSULTING ENGINEERS & SURVEYORS
619 N. Cascade Avenue, Suite 200
Colorado Springs, Colorado 80903
(719)785-0790
(719)785-0799 (Fax)

EXISTING CONDITIONS
CALCULATIONS

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JOB NAME: *FOREST LAKES FILING NO. 2A & 2B*
JOB NUMBER: *1175.02*
DATE: *03/11/16*
CALCULATED BY: *MAL*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY (EXISTING CONDITIONS)

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(2)	CA(5)	CA(10)	CA(25)	CA(50)	CA(100)
EX-A	2.51	1.06	0.90	0.96	1.45	0.08	0.35	0.43	0.61	**0.97**	**1.07**	**1.19**	**1.36**	**1.44**	**1.53**
EX-B	0.16	0.12	0.90	0.96	0.04	0.08	0.35	0.70	0.81	**0.11**	**0.11**	**0.12**	**0.12**	**0.13**	**0.13**
EX-C	2.76	0.79	0.90	0.96	1.97	0.08	0.35	0.31	0.52	**0.74**	**0.87**	**1.02**	**1.24**	**1.34**	**1.45**
EX-D	13.53	0.00	0.90	0.96	13.53	0.08	0.35	0.08	0.35	**0.27**	**1.08**	**2.03**	**3.38**	**4.06**	**4.74**
EX-E	13.10	0.00	0.90	0.96	13.10	0.08	0.35	0.08	0.35	**0.26**	**1.05**	**1.97**	**3.28**	**3.93**	**4.59**
EX-F	6.10	0.00	0.90	0.96	6.10	0.08	0.35	0.08	0.35	**0.12**	**0.49**	**0.92**	**1.53**	**1.83**	**2.14**
EX-G	11.34	0.00	0.90	0.96	11.34	0.08	0.35	0.08	0.35	**0.23**	**0.91**	**1.70**	**2.84**	**3.40**	**3.97**
EX-H	8.48	0.00	0.90	0.96	8.48	0.08	0.35	0.08	0.35	**0.17**	**0.68**	**1.27**	**2.12**	**2.54**	**2.97**
EX-I	2.58	1.00	0.90	0.96	1.58	0.08	0.35	0.40	0.59	**0.92**	**1.03**	**1.16**	**1.34**	**1.42**	**1.51**
EX-J	1.49	0.89	0.90	0.96	0.60	0.08	0.35	0.57	0.71	**0.80**	**0.85**	**0.91**	**0.99**	**1.03**	**1.06**
EX-AA	3.21	0.00	0.90	0.96	3.21	0.08	0.35	0.08	0.35	**0.06**	**0.26**	**0.48**	**0.80**	**0.96**	**1.12**
EX-BB	3.24	1.65	0.90	0.96	1.59	0.08	0.35	0.50	0.66	**1.50**	**1.61**	**1.76**	**1.95**	**2.04**	**2.14**
EX-CC	2.87	2.03	0.90	0.96	0.84	0.08	0.35	0.66	0.78	**1.82**	**1.89**	**1.99**	**2.12**	**2.18**	**2.24**
OS-A	213.78	0.00	0.90	0.96	213.78	0.08	0.35	0.08	0.35	**4.28**	**17.10**	**32.07**	**53.45**	**64.13**	**74.82**
OS-B	6.09	0.00	0.90	0.96	6.09	0.08	0.35	0.08	0.35	**0.12**	**0.49**	**0.91**	**1.52**	**1.83**	**2.13**

JOB NAME: *FOREST LAKES FILING NO. 2*
JOB NUMBER: *1175.02*
DATE: *03/20/03*
CALC'D BY: *MAL*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY (EXISTING CONDITIONS)

BASIN	WEIGHTED						OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY		TOTAL FLOWS	
	CA(2)	CA(5)	CA(10)	CA(25)	CA(50)	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)
EX-A	0.97	1.07	1.19	1.36	1.44	1.53	0.08	200	10	15.9	622	3.5%	6.5	1.6	17.4	3.29	5.53	3.5	8.4
EX-B	0.11	0.11	0.12	0.12	0.13	0.13	0.08	15	2	3.1	80	1.5%	4.3	0.3	5.0	5.17	8.68	0.6	1.1
EX-C	0.74	0.87	1.02	1.24	1.34	1.45	0.08	100	6	10.6	622	3.5%	6.5	1.6	12.1	3.84	6.44	3.3	9.3
EX-D	0.27	1.08	2.03	3.38	4.06	4.74	0.08	130	10	11.1	1500	3.0%	6.1	4.1	15.2	3.50	5.87	3.8	27.8
EX-E	0.26	1.05	1.97	3.28	3.93	4.59	0.08	200	10	15.9	600	3.3%	6.4	1.6	17.4	3.30	5.53	3.5	25.4
EX-F	0.12	0.49	0.92	1.53	1.83	2.14	0.08	400	26	20.6	1540	3.4%	6.5	4.0	24.5	2.78	4.67	1.4	10.0
EX-G	0.23	0.91	1.70	2.84	3.40	3.97	0.08	175	12	13.4	430	3.4%	6.5	1.1	14.5	3.57	6.00	3.2	23.8
EX-H	0.17	0.68	1.27	2.12	2.54	2.97	0.08	100	8	9.6	115	2.0%	4.9	0.4	10.0	4.13	6.93	2.8	20.6
EX-I	0.92	1.03	1.16	1.34	1.42	1.51	0.08	60	4	7.9	400	1.8%	4.7	1.4	9.3	4.23	7.11	4.3	10.8
EX-J	0.80	0.85	0.91	0.99	1.03	1.06	0.08	40	2	7.1	400	1.8%	4.7	1.4	8.5	4.37	7.34	3.7	7.8
EX-AA	0.06	0.26	0.48	0.80	0.96	1.12	0.08	150	8	13.4	660	2.7%	5.8	1.9	15.4	3.49	5.85	0.9	6.6
EX-BB	1.50	1.61	1.76	1.95	2.04	2.14	0.08	30	6	3.9	2035	3.6%	6.6	5.1	9.0	4.29	7.20	6.9	15.4
EX-CC	1.82	1.89	1.99	2.12	2.18	2.24	0.08	30	6	3.9	2035	3.6%	6.6	5.1	9.0	4.29	7.20	8.1	16.1
OS-A	4.28	17.10	32.07	53.45	64.13	74.82	0.08	1000	19.5	48.4	6960	4.0%	7.0	16.6	65.0	1.32	2.22	22.6	165.8
OS-B	0.12	0.49	0.91	1.52	1.83	2.13	0.08	70	5	8.3	475	3.4%	6.5	1.2	9.6	4.20	7.04	2.0	15.0

JOB NAME: *FOREST LAKES FILING NO. 2*
JOB NUMBER: *1175.02*
DATE: *03/11/16*
CALCULATED BY: *MAL*

FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY (EXISTING CONDITIONS)

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Inlet Size
					I(5)	I(100)	Q(5)	Q(100)	
1	BASIN OS-A	17.10	74.82	65.0	1.32	2.22	22.6	165.8	OFF-SITE RUNOFF
2	DP-1 + BASIN OS-B	17.59	76.95	65.0	1.32	2.22	23.2	170.5	Ex. Grated Inlets (Sump)
3	BASIN EX-A	1.07	1.53	17.4	3.29	5.53	3.5	8.4	Ex. 5' Type R Sump
4	BASIN EX-B	0.11	0.13	5.0	5.17	8.68	0.6	1.1	Ex. 5' Type R Sump
5	BASIN EX-C	0.87	1.45	12.1	3.84	6.44	3.3	9.3	EX. 15' Type R AT-GRADE
6	BASIN EX-E + PIPE 6 + PIPE 15	22.52	86.83	65.0	1.32	2.22	29.8	192.4	TEMP. SEDIMENT BASIN
7	DP-6 + BASIN EX-H	23.20	89.80	65.0	1.32	2.22	30.7	199.0	PINON LAKE
8	BASIN EX-D + Flow-By DP-5	1.12	5.12	15.2	3.50	5.87	3.9	30.1	Bristlecone Lake Outfall
9	BASIN EX-G	0.91	3.97	14.5	3.57	6.00	3.2	23.8	Surface to Delacroce
11	BASIN EX-I	1.03	1.51	9.3	4.23	7.11	4.3	10.8	Ex. 5' Type R Sump
12	BASIN EX-J	0.85	1.06	8.5	4.37	7.34	3.7	7.8	Ex. 5' Type R Sump
24	BASIN EX-AA	0.26	1.12	15.4	3.49	5.85	0.9	6.6	EX. Type D Grated Inlet
25	BASIN EX-BB	1.61	2.14	9.0	4.29	7.20	6.9	15.4	EX. 15' Type R AT-GRADE
26-EX	BASIN EX-CC	1.89	2.24	9.0	4.29	7.20	8.1	16.1	EX. 15' Type R AT-GRADE
27	Flow-By DP-25	0.42	0.83	9.0	4.29	7.20	1.8	6.0	EX. 15' Type R AT-GRADE
28	Flow-By DP-26-EX	0.49	0.87	9.0	4.29	7.20	2.1	6.3	EX. 15' Type R AT-GRADE
29-EX	BASIN EX-F + Flow-By DP-28	0.49	2.35	24.5	2.78	4.67	1.4	11.0	EX. Type D Grated Inlet (RTA)

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*03/11/16*
CALCULATED BY:	*MAL*

* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM GRADE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY (EXISTING CONDITIONS)

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Pipe Size*
					I(5)	I(100)	Q(5)	Q(100)	
1	DP-2	17.59	76.95	65.0	1.32	2.22	23.2	170.5	EX. 48" RCP
2	DP-3	1.07	1.53	17.4	3.29	5.53	3.5	8.4	EX. 18" RCP
3	PIPE 2 + DP-4	1.18	1.65	17.4	3.29	5.53	3.9	9.1	EX. 18" RCP
4	PIPE 1 + PIPE 3	18.77	78.61	65.0	1.32	2.22	24.8	174.2	EX. 48" RCP
5	DP-5 (Intercepted)	0.83	1.06	12.1	3.84	6.44	3.2	6.8	EX. 18" RCP
6	PIPE 4 + PIPE 5	19.60	79.67	65.0	1.32	2.22	25.9	176.5	EX. 48" RCP
7	DP-24	0.26	1.12	15.4	3.49	5.85	0.9	6.6	EX. 18" RCP
8	PIPE 7 + DP-25 (Intercepted)	1.45	2.43	15.4	3.49	5.85	5.1	14.2	EX. 18" RCP
9	PIPE 8 + DP-26 (Intercepted)	2.86	3.81	15.4	3.49	5.85	10.0	22.3	EX. 24" RCP
10	DP-27 (Intercepted)	0.42	0.62	9.0	4.29	7.20	1.8	4.5	EX. 18" RCP
11	PIPE 9 + PIPE 10 + DP-28 (Intercepted)	3.76	5.09	15.4	3.49	5.85	13.1	29.8	EX. 24" RCP

JOB NAME: *FOREST LAKES FILING NO. 2*
JOB NUMBER: *1175.02*
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REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY (EXISTING CONDITIONS)

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Pipe Size*
					I(5)	I(100)	Q(5)	Q(100)	
12	DP-29-EX	0.49	2.35	24.5	2.78	4.67	1.4	11.0	EX. 24" RCP (RTA)
13	PIPE 11 + PIPE 12	4.25	7.44	24.5	2.78	4.67	11.8	34.7	EX. 24" RCP (RTA)
14	DP-11	1.03	1.51	9.3	4.23	7.11	4.3	10.8	EX. 18" RCP
15	PIPE 14 + DP-12	1.88	2.58	9.3	4.23	7.11	7.9	18.3	EX. 24" RCP

DEVELOPED CONDITIONS
CALCULATIONS

CLASSIC SM
CONSULTING
ENGINEERS & SURVEYORS

JOB NAME: *FOREST LAKES FILING NO. 2*
JOB NUMBER: *1175.02*
DATE: *03/11/16*
CALCULATED BY: *MAL*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY (DEVELOPED CONDITIONS)

BASIN	TOTAL AREA (AC)	IMPERVIOUS AREA / STREETS			SINGLE-FAMILY LOTS/LANDSCAPE			WEIGHTED						WEIGHTED CA					
		AREA (AC)	C(5)	C(100)	AREA (AC)	C(5)	C(100)	C(2)	C(5)	C(10)	C(25)	C(50)	C(100)	CA(2)	CA(5)	CA(10)	CA(25)	CA(50)	CA(100)
A	2.51	1.06	0.90	0.96	1.45	0.08	0.35	0.39	0.43	0.48	0.54	0.57	0.61	0.97	1.07	1.19	1.36	1.44	1.53
B	0.16	0.12	0.90	0.96	0.04	0.08	0.35	0.67	0.70	0.73	0.77	0.79	0.81	0.11	0.11	0.12	0.12	0.13	0.13
C	2.76	0.79	0.90	0.96	1.97	0.08	0.35	0.27	0.31	0.37	0.45	0.49	0.52	0.74	0.87	1.02	1.24	1.34	1.45
D	3.37	1.03	0.90	0.96	2.34	0.22	0.44	0.39	0.43	0.48	0.54	0.57	0.60	1.31	1.44	1.60	1.81	1.91	2.02
E	2.78	1.06	0.90	0.96	1.72	0.35	0.52	0.52	0.56	0.60	0.64	0.67	0.69	1.46	1.56	1.66	1.79	1.85	1.91
F	0.59	0.20	0.45	0.59	0.39	0.08	0.35	0.15	0.21	0.27	0.35	0.39	0.43	0.09	0.12	0.16	0.21	0.23	0.25
G	3.49	0.68	0.90	0.96	2.81	0.45	0.59	0.50	0.54	0.57	0.62	0.64	0.66	1.76	1.88	2.00	2.16	2.25	2.31
H	0.60	0.33	0.90	0.96	0.27	0.45	0.59	0.67	0.70	0.73	0.76	0.78	0.79	0.40	0.42	0.44	0.46	0.47	0.48
I	2.58	1.00	0.90	0.96	1.58	0.08	0.35	0.36	0.40	0.45	0.52	0.55	0.59	0.92	1.03	1.16	1.34	1.42	1.51
J	0.99	0.53	0.90	0.96	0.46	0.08	0.35	0.49	0.52	0.56	0.62	0.65	0.68	0.48	0.51	0.56	0.61	0.64	0.67
K	6.58	1.29	0.90	0.96	5.29	0.32	0.5	0.39	0.43	0.48	0.53	0.56	0.59	2.58	2.85	3.14	3.49	3.71	3.88
L	0.97	0.39	0.90	0.96	0.58	0.45	0.59	0.60	0.63	0.66	0.70	0.72	0.74	0.58	0.61	0.64	0.68	0.70	0.72
M	0.87	0.00	0.90	0.96	0.87	0.08	0.35	0.02	0.06	0.15	0.25	0.30	0.35	0.02	0.07	0.13	0.22	0.26	0.30
N	2.46	1.19	0.90	0.96	1.27	0.08	0.35	0.44	0.48	0.52	0.58	0.61	0.65	1.08	1.17	1.29	1.44	1.51	1.59
P	6.85	1.28	0.90	0.96	5.57	0.40	0.56	0.46	0.49	0.54	0.58	0.62	0.63	3.14	3.38	3.68	3.99	4.22	4.35
Q	1.68	0.55	0.90	0.96	1.13	0.33	0.51	0.49	0.52	0.56	0.61	0.63	0.66	0.82	0.87	0.94	1.03	1.06	1.10
R	2.14	0.65	0.90	0.96	1.49	0.45	0.59	0.56	0.59	0.62	0.66	0.69	0.70	1.19	1.26	1.33	1.42	1.47	1.50
S	0.64	0.24	0.90	0.96	0.40	0.45	0.59	0.59	0.62	0.65	0.69	0.71	0.73	0.38	0.40	0.42	0.44	0.46	0.47
T	1.02	0.38	0.90	0.96	0.64	0.45	0.59	0.59	0.62	0.65	0.69	0.71	0.73	0.60	0.63	0.66	0.70	0.73	0.74
U	2.03	0.62	0.45	0.59	1.41	0.08	0.35	0.14	0.19	0.25	0.34	0.38	0.42	0.28	0.39	0.52	0.69	0.78	0.86
V	8.61	2.25	0.45	0.59	6.36	0.08	0.35	0.12	0.18	0.24	0.33	0.37	0.41	1.05	1.52	2.06	2.81	3.19	3.55
W	2.25	1.10	0.45	0.59	1.15	0.08	0.35	0.21	0.26	0.32	0.39	0.43	0.47	0.47	0.59	0.71	0.88	0.97	1.05
X	3.55	2.40	0.45	0.59	1.15	0.08	0.35	0.28	0.33	0.38	0.45	0.48	0.51	1.01	1.17	1.35	1.58	1.71	1.82
Y	0.49	0.36	0.45	0.59	0.13	0.08	0.35	0.31	0.35	0.40	0.46	0.50	0.53	0.15	0.17	0.20	0.23	0.24	0.26
Z	0.84	0.84	0.45	0.59	0.00	0.08	0.35	0.41	0.45	0.49	0.54	0.57	0.59	0.34	0.38	0.41	0.45	0.48	0.50
AA	3.21	0.00	0.90	0.96	3.21	0.08	0.35	0.02	0.06	0.15	0.25	0.30	0.35	0.06	0.26	0.48	0.80	0.96	1.12
BB	3.24	1.65	0.90	0.96	1.59	0.08	0.35	0.46	0.50	0.54	0.60	0.63	0.66	1.50	1.61	1.76	1.95	2.04	2.14
CC	0.93	0.78	0.90	0.96	0.15	0.08	0.35	0.75	0.77	0.80	0.83	0.85	0.86	0.70	0.71	0.74	0.77	0.79	0.80
DD	2.00	0.00	0.90	0.96	2.00	0.08	0.35	0.02	0.06	0.15	0.25	0.30	0.35	0.04	0.16	0.30	0.50	0.60	0.70
								0.02	0.06	0.15	0.25	0.30	0.35	4.28	17.10	32.07	53.45	64.13	74.82
OS-A	213.78	0.00	0.90	0.96	213.78	0.08	0.35	0.02	0.06	0.15	0.25	0.30	0.35	0.12	0.49	0.91	1.52	1.83	2.13
OS-B	6.09	0.00	0.90	0.96	6.09	0.08	0.35	0.02	0.06	0.15	0.25	0.30	0.35						

JOB NAME: *FOREST LAKES FILING NO. 2*
JOB NUMBER: *1175.02*
DATE: *03/20/03*
CALC'D BY: *MAL*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY (DEVELOPED CONDITIONS)

BASIN	WEIGHTED						OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY		TOTAL FLOWS	
	CA(2)	CA(5)	CA(10)	CA(25)	CA(50)	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)
A	0.97	1.07	1.19	1.36	1.44	1.53	0.08	200	10	15.9	622	3.5%	6.5	1.6	17.4	3.29	5.53	3.5	8.4
B	0.11	0.11	0.12	0.12	0.13	0.13	0.08	15	2	3.1	80	1.5%	4.3	0.3	5.0	5.17	8.68	0.6	1.1
C	0.74	0.87	1.02	1.24	1.34	1.45	0.08	100	6	10.6	622	3.5%	6.5	1.6	12.1	3.84	6.44	3.3	9.3
D	1.31	1.44	1.60	1.81	1.91	2.02	0.08	150	8	13.4	720	1.5%	4.3	2.8	16.2	3.40	5.71	4.9	11.5
E	1.46	1.56	1.66	1.79	1.85	1.91	0.45	90	4	7.0	720	1.5%	4.3	2.8	9.8	4.15	6.97	6.5	13.3
F	0.09	0.12	0.16	0.21	0.23	0.25	0.45	55	6	4.1	240	2.5%	5.5	0.7	5.0	5.17	8.68	0.6	2.2
G	1.76	1.88	2.00	2.16	2.25	2.31	0.45	135	5	9.2	325	1.5%	4.3	1.3	10.4	4.07	6.83	7.6	15.8
H	0.40	0.42	0.44	0.46	0.47	0.48	0.45	50	1	6.8	420	1.5%	4.3	1.6	8.5	4.38	7.35	1.8	3.5
I	0.92	1.03	1.16	1.34	1.42	1.51	0.08	60	4	7.9	400	1.8%	4.7	1.4	9.3	4.23	7.11	4.3	10.8
J	0.48	0.51	0.56	0.61	0.64	0.67	0.08	40	2	7.1	400	1.8%	4.7	1.4	8.5	4.37	7.34	2.2	4.9
K	2.58	2.85	3.14	3.49	3.71	3.88	0.45	100	2	9.7	615	4.0%	7.0	1.5	11.1	3.97	6.66	11.3	25.9
L	0.58	0.61	0.64	0.68	0.70	0.72	0.45	50	1	6.8	520	1.5%	4.3	2.0	8.9	4.31	7.24	2.6	5.2
M	0.02	0.07	0.13	0.22	0.26	0.30	0.08	50	16	4.3	115	1.0%	3.5	0.5	5.0	5.17	8.68	0.4	2.6
N	1.08	1.17	1.29	1.44	1.51	1.59	0.08	30	1	7.0	1290	3.8%	6.8	3.2	10.2	4.10	6.89	4.8	10.9
P	3.14	3.38	3.68	3.99	4.22	4.35	0.45	100	2	9.7	1100	3.1%	6.2	3.0	12.6	3.78	6.34	12.8	27.6

JOB NAME: *FOREST LAKES FILING NO. 2*
JOB NUMBER: *1175.02*
DATE: *03/20/03*
CALC'D BY: *MAL*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY (DEVELOPED CONDITIONS)

BASIN	WEIGHTED						OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY		TOTAL FLOWS	
	CA(2)	CA(5)	CA(10)	CA(25)	CA(50)	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)
Q	0.82	0.87	0.94	1.03	1.06	1.10	0.45	55	2	5.9	815	2.5%	5.5	2.5	8.3	4.40	7.39	3.8	8.2
R	1.19	1.26	1.33	1.42	1.47	1.50	0.45	50	1	6.8	740	1.5%	4.3	2.9	9.7	4.17	7.01	5.2	10.5
S	0.38	0.40	0.42	0.44	0.46	0.47	0.45	50	1	6.8	200	1.5%	4.3	0.8	7.6	4.54	7.62	1.8	3.6
T	0.60	0.63	0.66	0.70	0.73	0.74	0.45	50	1	6.8	530	3.5%	6.5	1.3	8.2	4.43	7.44	2.8	5.5
U	0.28	0.39	0.52	0.69	0.78	0.86	0.45	80	6	5.6	250	10.0%	11.1	0.4	6.0	4.90	8.23	1.9	7.1
V	1.05	1.52	2.06	2.81	3.19	3.55	0.45	150	20	6.3	200	15.0%	13.6	0.2	6.6	4.76	7.99	7.2	28.4
W	0.47	0.59	0.71	0.88	0.97	1.05	0.45	60	7	4.2	100	18.0%	14.8	0.1	5.0	5.17	8.68	3.0	9.1
X	1.01	1.17	1.35	1.58	1.71	1.82	0.45	60	10	3.7	70	14.0%	13.1	0.1	5.0	5.17	8.68	6.1	15.8
Y	0.15	0.17	0.20	0.23	0.24	0.26	0.45	94	20	4.3	0	1.0%	3.5	0.0	5.0	5.17	8.68	0.9	2.2
Z	0.34	0.38	0.41	0.45	0.48	0.50	0.45	30	6	2.5	96	2.0%	4.9	0.3	5.0	5.17	8.68	2.0	4.3
AA	0.06	0.26	0.48	0.80	0.96	1.12	0.08	150	8	13.4	660	2.7%	5.8	1.9	15.4	3.49	5.85	0.9	6.6
BB	1.50	1.61	1.76	1.95	2.04	2.14	0.08	30	6	3.9	2035	3.6%	6.6	5.1	9.0	4.29	7.20	6.9	15.4
CC	0.70	0.71	0.74	0.77	0.79	0.80	0.08	30	6	3.9	625	3.6%	6.6	1.6	5.5	5.04	8.46	3.6	6.8
DD	0.04	0.16	0.30	0.50	0.60	0.70	0.08	150	8	13.4	550	3.3%	6.4	1.4	14.9	3.53	5.93	0.6	4.2
OS-A	4.28	17.10	32.07	53.45	64.13	74.82	0.08	1000	19.5	48.4	6960	4.0%	7.0	16.6	65.0	1.32	2.22	22.6	165.8
OS-B	0.12	0.49	0.91	1.52	1.83	2.13	0.08	70	5	8.3	475	3.4%	6.5	1.2	9.6	4.20	7.04	2.0	15.0

JOB NAME: *FOREST LAKES FILING NO. 2*
JOB NUMBER: *1175.02*
DATE: *03/15/16*
CALCULATED BY: *MAL*

FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Inlet Size
					I(5)	I(100)	Q(5)	Q(100)	
1	BASIN OS-A	17.10	74.82	65.0	1.32	2.22	22.6	165.8	OFF-SITE RUNOFF
2	DP-1 + BASIN OS-B	17.59	76.95	65.0	1.32	2.22	23.2	170.5	Ex. Grated Inlets (Sump)
3	BASIN A	1.07	1.53	17.4	3.29	5.53	3.5	8.4	Ex. 5' Type R Sump
4	BASIN B	0.11	0.13	5.0	5.17	8.68	0.6	1.1	Ex. 5' Type R Sump
5	BASIN C	0.87	1.45	12.1	3.84	6.44	3.3	9.3	EX. 15' Type R AT-GRADE
6	BASIN D + Flow-By DP-5	1.48	2.41	14.9	3.53	5.92	5.2	14.3	Prop. 5' Type R Sump
7	BASIN E	1.56	1.91	9.8	4.15	6.97	6.5	13.3	Prop. 5' Type R Sump
8	BASIN F	0.12	0.25	5.0	5.17	8.68	0.6	2.2	Type D Grated Inlet
9	BASIN G	1.88	2.31	10.4	4.07	6.83	7.6	15.8	Prop. 10' Type R Sump
10	BASIN H	0.42	0.48	8.5	4.38	7.35	1.8	3.5	Prop. 5' Type R Sump
11	BASIN I	1.03	1.51	9.3	4.23	7.11	4.3	10.8	Ex. 5' Type R Sump
12	BASIN J	0.51	0.67	8.5	4.37	7.34	2.2	4.9	Ex. 5' Type R Sump
13	BASIN K	2.85	3.88	11.1	3.97	6.66	11.3	25.9	Prop. 15' Type R Sump
14	BASIN L	0.61	0.72	8.9	4.31	7.24	2.6	5.2	Prop. 5' Type R Sump
15	PIPE 18 + BASIN M	10.53	14.45	15.8	3.44	5.78	36.2	83.5	SWQ Detention Pond A

JOB NAME: *FOREST LAKES FILING NO. 2*
JOB NUMBER: *1175.02*
DATE: *03/15/16*
CALCULATED BY: *MAL*

FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY (DEVELOPED CONDITIONS)

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Inlet Size
					I(5)	I(100)	Q(5)	Q(100)	
16	PIPE 6 + PIPE 19 + BASIN W + BASIN X	21.56	88.78	65.0	1.32	2.22	28.5	196.7	Release to Lake
17	BASIN R	1.26	1.50	9.7	4.17	7.01	5.2	10.5	Prop. 5' Type R Sump
18	BASIN S	0.40	0.47	7.6	4.54	7.62	1.8	3.6	Prop. 5' Type R Sump
19	BASIN Q	0.87	1.10	8.3	4.40	7.39	3.8	8.2	Prop. 10' Type R At-Grade
20	BASIN N	1.17	1.59	10.2	4.10	6.89	4.8	10.9	Surface - Forest Lakes Dr.
21	DP-20 + Flow-By DP-19 + BASIN P	4.78	6.35	12.6	3.78	6.34	18.1	40.3	Prop. 20' Type R Sump
22	BASIN T	0.63	0.74	8.2	4.43	7.44	2.8	5.5	Prop. 10' Type R Sump
23	PIPE 26 + BASIN U	8.09	10.61	12.9	3.74	6.28	30.3	66.7	SWQ Detention Pond B
24	BASIN AA	0.26	1.12	15.4	3.49	5.85	0.9	6.6	Ex. Type D Grated Inlet
25	BASIN BB	1.61	2.14	9.0	4.29	7.20	6.9	15.4	EX. 15' Type R AT-GRADE
26-DEV	BASIN CC	0.71	0.80	5.5	5.04	8.46	3.6	6.8	EX. 15' Type R AT-GRADE
27	DP-25 (Flow-By)	0.42	0.83	9.0	4.29	7.20	1.8	6.0	EX. 15' Type R AT-GRADE
28	DP-26-DEV (Flow-By)	0.06	0.20	5.5	5.04	8.46	0.3	1.7	EX. 15' Type R AT-GRADE
29-DEV	BASIN DD	0.16	0.70	14.9	3.53	5.93	0.6	4.2	Ex. Type D Grated Inlet (RTA)
30	BASIN Y + BASIN Z	0.55	0.75	5.0	5.17	8.68	2.8	6.5	Surface to Delacrose

JOB NAME: *FOREST LAKES FILING NO. 2*
JOB NUMBER: *1175.02*
DATE: *03/11/16*
CALCULATED BY: *MAL*

* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM GRADE. REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		
					I(5)	I(100)	Q(5)	Q(100)	Pipe Size*
1	DP-2	17.59	76.95	65.0	1.32	2.22	23.2	170.5	EX. 48" RCP
2	DP-3	1.07	1.53	17.4	3.29	5.53	3.5	8.4	EX. 18" RCP
3	PIPE 2 + DP-4	1.18	1.65	17.4	3.29	5.53	3.9	9.1	EX. 18" RCP
4	PIPE 1 + PIPE 3	18.77	78.61	65.0	1.32	2.22	24.8	174.2	EX. 48" RCP
5	DP-5 (Intercepted)	0.83	1.06	12.1	3.84	6.44	3.2	6.8	EX. 18" RCP
6	PIPE 4 + PIPE 5	19.60	79.67	65.0	1.32	2.22	25.9	176.5	EX. 48" RCP
7	DP-7	1.56	1.91	9.8	4.15	6.97	6.5	13.3	24" RCP
8	PIPE 7 + DP-6	3.04	4.32	14.9	3.53	5.92	10.7	25.6	30" RCP
9	DP-8	0.12	0.25	5.0	5.17	8.68	0.6	2.2	18" RCP
10	PIPE 8 + PIPE 9	3.16	4.57	14.9	3.53	5.92	11.1	27.1	30" RCP
11	DP-9	1.88	2.31	10.4	4.07	6.83	7.6	15.8	24" RCP
12	DP-10	0.42	0.48	8.5	4.38	7.35	1.8	3.5	18" RCP
13	PIPE 10 + PIPE 11 + PIPE 12	5.45	7.36	15.8	3.44	5.78	18.8	42.5	36" RCP

JOB NAME: *FOREST LAKES FILING NO. 2*
JOB NUMBER: *1175.02*
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* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM GRADE. REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Pipe Size*
					I(5)	I(100)	Q(5)	Q(100)	
14	DP-11	1.03	1.51	9.3	4.23	7.11	4.3	10.8	EX. 18" RCP
15	PIPE 14 + DP-12	1.54	2.18	9.3	4.23	7.11	6.5	15.5	24" RCP
16	DP-13	2.85	3.88	11.1	3.97	6.66	11.3	25.9	30" RCP
17a	DP-14	0.61	0.72	8.9	4.31	7.24	2.6	5.2	24" RCP
17b	PIPE 16 + PIPE 17a	3.47	4.60	11.1	3.97	6.66	13.8	30.6	30" RCP
18	PIPE 13 + PIPE 15 + PIPE 17b	10.46	14.14	15.8	3.44	5.78	36.0	81.7	42" RCP
19	POND 'A' RELEASE	0.20	6.24	15.8	3.44	5.78	0.7	36.0	30" RCP
20	DP-17	1.26	1.50	9.7	4.17	7.01	5.2	10.5	18" RCP
21	PIPE 20 + DP-18	1.65	1.97	9.7	4.17	7.01	6.9	13.8	24" RCP
22	DP-19 (Intercepted)	0.64	0.69	8.3	4.40	7.39	2.8	5.1	18" RCP
23	PIPE 21 + PIPE 22	2.29	2.66	9.7	4.17	7.01	9.6	18.6	24" RCP
24	DP-21	4.78	6.35	12.6	3.78	6.34	18.1	40.3	36" RCP
25	DP-22	0.63	0.74	8.2	4.43	7.44	2.8	5.5	18" RCP

JOB NAME: *FOREST LAKES FILING NO. 2*
JOB NUMBER: *1175.02*
DATE: *03/11/16*
CALCULATED BY: *MAL*

* PIPES ARE LISTED AT MAXIMUM SIZE REQUIRED TO ACCOMMODATE Q100 FLOWS AT MINIMUM GRADE.
REFER TO INDIVIDUAL PIPE SHEETS FOR HYDRAULIC INFORMATION.

FINAL DRAINAGE REPORT ~ PIPE ROUTING SUMMARY

Pipe Run	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Pipe Size*
					I(5)	I(100)	Q(5)	Q(100)	
26	PIPE 23 + PIPE 24 + PIPE 25	7.70	9.75	12.6	3.78	6.34	29.1	61.8	36" @ 0.9%
27	POND 'B' RELEASE	0.08	0.88	12.9	3.74	6.28	0.3	5.5	18" RCP
28	DP-24	0.26	1.12	15.4	3.49	5.85	0.9	6.6	EX. 18" RCP
29	PIPE 28 + DP-25 (Intercepted)	1.45	2.43	15.4	3.49	5.85	5.1	14.2	EX. 18" RCP
30	PIPE 27 + PIPE 29 + DP-26 (Intercepted)	2.19	3.91	15.4	3.49	5.85	7.6	22.9	EX. 24" RCP
31	DP-27 (Intercepted)	0.42	0.62	9.0	4.29	7.20	1.8	4.5	EX. 18" RCP
32	PIPE 30 + PIPE 31 + DP-28 (Intercepted)	2.67	4.74	15.4	3.49	5.85	9.3	27.7	EX. 24" RCP
33	DP-29-DEV	0.16	0.70	14.9	3.53	5.93	0.6	4.2	EX. 24" RCP (RTA)
34	PIPE 32 + PIPE 33	2.83	5.44	15.4	3.49	5.85	9.8	31.8	EX. 24" RCP (RTA)

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*03/11/16*
CALCULATED BY:	*MAL*

FINAL DRAINAGE REPORT ~ PIPE TRAVEL TIMES

PIPE RUN	STREET / CHANNEL FLOW				
	Pipe Diameter (ft)	Length (ft)	Slope (%)	Velocity (fps)	Tc (min)
8	2.5	540	1.5%	10.3	0.9
23	2.0	275	4.5%	15.3	0.3

MANNINGS n = 0.013

FIL 2A - MAIN C INTO POND

100 YR. STORM

HGL CALCULATION

3/11/2016 14:52

STATION	PIPE SIZE (inches)	PEAK RATE (cfs)	AREA (sf)	VELOCITY (fps)	CONV. K	FRICTION SLOPE (ft/ft)	JUNCTION DATA LENGTH (ft)	JUNCTION DATA LATERAL SIZE (inches)	JUNCTION DATA LATERAL ANGLE (degrees)	BEND LOSS K	FRICTION LOSS (ft)	BEND LOSS (ft)	JUNCTION LOSS (ft)	M.H. LOSS (ft)	ENTRANCE LOSS (ft)	TOTAL LOSS (ft)	ENERGY GRADE LINE (elevation)	VELOCITY HEAD (ft)	HYDRAULIC GRADE LINE (elevation)	
																	6833.70			
107.05	36	61.8														0.00	6833.70	1.19	6832.51	
107.05	36	61.8	7.065	8.75	666	0.008616	0.00				0.00									
151.75	36	61.8	7.065	8.75	666	0.008616	44.70				0.39		0.00			0.39	6834.09	1.19	6832.90	
151.75	36	61.8	7.065	8.75	666	0.008616	0.00			0.3	0.00	0.36	0.00			0.36	6834.44	1.19	6833.25	35 HZ BEND
281.62	36	61.8	7.065	8.75	666	0.008616	129.87				1.12	0.00	0.00			1.12	6835.56	1.19	6834.37	
281.62	36	61.8	7.065	8.75	666	0.008616	0.00				0.00	0.00	0.000	1.09		1.09	6836.65	1.19	6835.47	TYPE I MH
286.62	30	40.3	4.906	8.21	409	0.009700	5.00				0.05		0.00			0.05	6836.70	1.05	6835.65	
286.62	30	40.3	4.906	8.21	409	0.009700	0.00				0.00	0.00	0.00			0.00	6836.70	1.05	6835.65	END MH
317.77	30	40.3	4.906	8.21	409	0.009700	31.15				0.30		0.00			0.30	6837.00	1.05	6835.96	
317.77	30	40.3	4.906	8.21	409	0.009700	0.00				0.00	0.00	0.00	1.57		1.57	6838.58	1.05	6837.53	20' SUMP INLET

MANNINGS n = 0.013

FIL 2A - MAIN A

100 YR. STORM

HGL CALCULATION

3/11/2016 14:52

STATION	PIPE SIZE (inches)	PEAK RATE (cfs)	AREA (sf)	VELOCITY (fps)	CONV. K	FRICTION SLOPE (ft/ft)	JUNCTION DATA LENGTH (ft)	JUNCTION DATA LATERAL SIZE (inches)	JUNCTION DATA LATERAL ANGLE (degrees)	BEND LOSS K	FRICTION LOSS (ft)	BEND LOSS (ft)	JUNCTION LOSS (ft)	M.H. LOSS (ft)	ENTRANCE LOSS (ft)	TOTAL LOSS (ft)	ENERGY GRADE LINE (elevation)	VELOCITY HEAD (ft)	HYDRAULIC GRADE LINE (elevation)	
																	6836.01			
100	24	18.6														0.00	6836.01	0.54	6835.47	
100	24	18.6	3.140	5.92	226	0.006803	0.00				0.00									
438.26	24	18.6	3.140	5.92	226	0.006803	338.26				2.30		0.00			2.30	6841.78	0.54	6841.24	
438.26	24	18.6	3.140	5.92	226	0.006803	0.00				0.00	0.00	0.00	0.49		0.49	6842.27	0.54	6841.73	TYPE I MH
443.26	24	18.6	3.140	5.92	226	0.006803	5.00				0.03	0.00	0.00			0.03	6842.30	0.54	6841.76	
443.26	24	13.8	3.140	4.39	226	0.003745	0.00				0.00	0.00	0.000			0.00	6842.30	0.30	6842.00	END MH
634.21	24	13.8	3.140	4.39	226	0.003745	190.95				0.72		0.00			0.72	6850.06	0.30	6849.76	
634.21	24	13.8	3.140	4.39	226	0.003745	0.00			0.35	0.00	0.10	0.00			0.10	6850.16	0.30	6849.87	45 HZ BEND
649.21	24	13.8	3.140	4.39	226	0.003745	15.00				0.06		0.00			0.06	6850.22	0.30	6849.92	
649.21	24	13.8	3.140	4.39	226	0.003745	0.00			0.35	0.00	0.10	0.00			0.10	6850.33	0.30	6850.03	45 HZ BEND
711.16	24	13.8	3.140	4.39	226	0.003745	61.95				0.23		0.00			0.23	6850.56	0.30	6850.26	
711.16	24	13.8	3.140	4.39	226	0.003745	0.00				0.00	0.00	0.00	1.20		1.20	6851.76	0.30	6851.46	5' INLET
714.98	24	13.8	3.140	4.39	226	0.003745	65.77				0.25		0.00			0.25	6852.00	0.30	6851.70	
714.98	24	13.8	3.140	4.39	226	0.003745	0.00				0.00	0.00	0.00			0.00	6852.00	0.30	6851.70	END INLET
750.62	18	10.5	1.766	5.94	105	0.010074	39.46				0.40		0.00			0.40	6852.40	0.55	6851.85	
750.62	18	10.5	1.766	5.94	105	0.010074	0.00				0.00	0.00	0.00	0.82		0.82	6853.22	0.55	6852.68	5' INLET

MANNINGS n = 0.013

FIL 2A - LAT B

100 YR. STORM

HGL CALCULATION

3/11/2016 14:52

STATION	PIPE SIZE (inches)	PEAK RATE (cfs)	AREA (sf)	VELOCITY (fps)	CONV. K	FRICTION SLOPE (ft/ft)	JUNCTION DATA LENGTH (ft)	JUNCTION DATA LATERAL SIZE (inches)	JUNCTION DATA LATERAL ANGLE (degrees)	BEND LOSS K	FRICTION LOSS (ft)	BEND LOSS (ft)	JUNCTION LOSS (ft)	M.H. LOSS (ft)	ENTRANCE LOSS (ft)	TOTAL LOSS (ft)	ENERGY GRADE LINE (elevation)	VELOCITY HEAD (ft)	HYDRAULIC GRADE LINE (elevation)	
																	6841.36			
100	18	5.1														0.00	6841.36	0.13	6841.23	END AT-GRADE INLI
100	18	5.1	1.766	2.89	105	0.002377	0.00				0.00	0.00				0.06	6829.28	0.13	6829.15	
127	18	5.1	1.766	2.89	105	0.002377	27.00				0.06	0.00	0.00			0.06	6829.47	0.13	6829.34	TYPE D GRATED INI
127	18	5.1	1.766	2.89	105	0.002377	0.00				0.00	0.00	0.00	0.19		0.19				

MANNINGS n = 0.013

FIL 2A POND OUTFALL

100 YR. STORM

HGL CALCULATION

3/11/2016 14:52

STATION	PIPE SIZE (inches)	PEAK RATE (cfs)	AREA (sf)	VELOCITY (fps)	CONV. K	FRICTION SLOPE (ft/ft)	JUNCTION DATA LENGTH (ft)	JUNCTION DATA LATERAL SIZE (inches)	JUNCTION DATA LATERAL ANGLE (degrees)	BEND LOSS K	FRICTION LOSS (ft)	BEND LOSS (ft)	JUNCTION LOSS (ft)	M.H. LOSS (ft)	ENTRANCE LOSS (ft)	TOTAL LOSS (ft)	ENERGY GRADE LINE (elevation)	VELOCITY HEAD (ft)	HYDRAULIC GRADE LINE (elevation)	
																	6813.85			
100	18	5.9														0.00	6813.85	0.17	6813.68	BEGIN MH
100	18	5.9	1.766	3.34	105	0.003181	0.00				0.00					0.72	6814.57	0.17	6814.40	
327.7	18	5.9	1.766	3.34	105	0.003181	227.70				0.72		0.00			0.04	6814.61	0.17	6814.44	22 HZ BEND
327.7	18	5.9	1.766	3.34	105	0.003181	0.00			0.21	0.00	0.04	0.00			0.16	6823.10	0.17	6822.93	
377.26	18	5.9	1.766	3.34	105	0.003181	49.56				0.16	0.00	0.00			0.01	6823.11	0.17	6822.94	VERT. BEND
377.26	18	5.9	1.766	3.34	105	0.003181	0.00			0.08	0.00	0.01	0.000			0.23	6828.10	0.17	6827.93	
450.27	18	5.9	1.766	3.34	105	0.003181	73.01				0.23		0.00			0.26	6828.36	0.17	6828.19	POND BOX
450.27	18	5.9	1.766	3.34	105	0.003181	0.00				0.00	0.00	0.00	0.26						

MANNINGS n = 0.013

FIL 2B - MAIN 'B' OUTFALL TO POND

100 YR. STORM

HGL CALCULATION

3/11/2016 14:52

STATION	PIPE SIZE (inches)	PEAK RATE (cfs)	AREA (sf)	VELOCITY (fps)	CONV. K	FRICTION SLOPE (ft/ft)	JUNCTION DATA LENGTH (ft)	JUNCTION DATA LATERAL SIZE (inches)	JUNCTION DATA LATERAL ANGLE (degrees)	BEND LOSS K	FRICTION LOSS (ft)	BEND LOSS (ft)	JUNCTION LOSS (ft)	M.H. LOSS (ft)	ENTRANCE LOSS (ft)	TOTAL LOSS (ft)	ENERGY GRADE LINE (elevation)	VELOCITY HEAD (ft)	HYDRAULIC GRADE LINE (elevation)	
																	6859.94			
96.8	42	81.7														0.00	6859.94	1.12	6858.82	FES
96.8	42	81.7	9.616	8.50	1005	0.006611	0.00				0.00					0.31	6860.25	1.12	6859.13	
143.54	42	81.7	9.616	8.50	1005	0.006611	46.74				0.31		0.00			3.00	6863.25	1.12	6862.13	TYPE I MH
143.54	42	81.7	9.616	8.50	1005	0.006611	0.00				0.00	0.00	0.00	3.00		0.02	6863.28	0.38	6862.90	
148.54	24	15.5	3.140	4.94	226	0.004724	5.00				0.02	0.00	0.00			0.00	6863.28	0.38	6862.90	END MH
148.54	24	15.5	3.140	4.94	226	0.004724	0.00				0.00	0.00	0.000			0.17	6863.45	0.38	6863.07	
184.61	24	15.5	3.140	4.94	226	0.004724	36.07				0.17		0.00			0.13	6863.58	0.38	6863.20	45 HZ BEND
184.61	24	15.5	3.140	4.94	226	0.004724	0.00			0.35	0.00	0.13	0.00			1.05	6867.42	0.38	6867.04	
407.41	24	15.5	3.140	4.94	226	0.004724	222.80				1.05		0.00			1.51	6868.93	0.38	6868.56	TYPE I MH
407.41	24	15.5	3.140	4.94	226	0.004724	0.00				0.00	0.00	0.00	1.51		0.02	6868.96	0.38	6868.58	
412.45	24	15.5	3.140	4.94	226	0.004724	5.04				0.02		0.00			0.00	6868.96	0.38	6868.58	END MH
412.45	24	15.5	3.140	4.94	226	0.004724	0.00				0.00	0.00	0.00			0.80	6873.33	0.38	6872.95	
576.34	24	15.5	3.140	4.94	226	0.004724	168.93				0.80		0.00			1.51	6874.84	0.38	6874.47	TYPE I MH
576.34	24	15.5	3.140	4.94	226	0.004724	0.00				0.00	0.00	0.00	1.51		0.02	6874.87	0.38	6874.49	
581.38	24	15.5	3.140	4.94	226	0.004724	5.04				0.02		0.00			0.00	6874.87	0.38	6874.49	END MH
581.38	24	15.5	3.140	4.94	226	0.004724	0.00				0.00	0.00	0.00			0.47	6877.03	0.38	6876.65	
681.82	24	15.5	3.140	4.94	226	0.004724	100.44				0.47		0.00			0.13	6877.16	0.38	6876.78	45 HZ BEND
681.82	24	15.5	3.140	4.94	226	0.004724	0.00			0.35	0.00	0.13	0.00			0.08	6877.24	0.38	6876.86	
697.82	24	15.5	3.140	4.94	226	0.004724	16.00				0.08		0.00			0.13	6877.37	0.38	6876.99	CONNECT TO EX.
697.82	24	15.5	3.140	4.94	226	0.004724	0.00			0.35	0.00	0.13	0.00							

MANNINGS n = 0.013

FIL 2B MAIN 'A' (TO THE WEST)

100 YR. STORM

HGL CALCULATION

3/11/2016 14:52

STATION	PIPE SIZE (inches)	PEAK RATE (cfs)	AREA (sf)	VELOCITY (fps)	CONV. K	FRICTION SLOPE (ft/ft)	JUNCTION DATA LENGTH (ft)	JUNCTION DATA LATERAL SIZE (inches)	JUNCTION DATA LATERAL ANGLE (degrees)	BEND LOSS K	FRICTION LOSS (ft)	BEND LOSS (ft)	JUNCTION LOSS (ft)	M.H. LOSS (ft)	ENTRANCE LOSS (ft)	TOTAL LOSS (ft)	ENERGY GRADE LINE (elevation)	VELOCITY HEAD (ft)	HYDRAULIC GRADE LINE (elevation)	
																	6862.69			
100	36	42.5														0.00	6862.69	0.56	6862.13	BEGIN MH
100	36	42.5	7.065	6.02	666	0.004075	0.00				0.00					0.19	6862.88	0.56	6862.32	
146.64	36	42.5	7.065	6.02	666	0.004075	46.64				0.19		0.00			0.20	6863.08	0.56	6862.51	45 HZ BEND
146.64	36	42.5	7.065	6.02	666	0.004075	0.00			0.35	0.00	0.20	0.00			0.06	6863.14	0.56	6862.58	
162.42	36	42.5	7.065	6.02	666	0.004075	15.78				0.06	0.00	0.00			0.07	6863.21	0.47	6862.74	18" WYE
162.42	36	39	7.065	5.52	666	0.003431	0.00	18	45		0.00	0.00	0.067			0.04	6863.25	0.47	6862.78	
174.42	36	39	7.065	5.52	666	0.003431	12.00				0.04		0.00			0.10	6863.35	0.23	6863.13	24" WYE
174.42	36	27.1	7.065	3.84	666	0.001657	0.00	24	45		0.00	0.00	0.10			0.02	6863.38	0.23	6863.15	
189.06	36	27.1	7.065	3.84	666	0.001657	14.64				0.02		0.00			0.00	6863.38	0.23	6863.15	BEGIN REDUCER
189.06	36	27.1	7.065	3.84	666	0.001657	0.00				0.00	0.00	0.00			0.04	6863.41	0.47	6862.94	
197.06	30	27.1	4.906	5.52	409	0.004386	8.00				0.04		0.00			0.00	6863.41	0.47	6862.94	END REDUCER
197.06	30	27.1	4.906	5.52	409	0.004386	0.00				0.00	0.00	0.00			0.30	6864.51	0.47	6864.04	
264.52	30	27.1	4.906	5.52	409	0.004386	67.46				0.30		0.00			0.10	6864.61	0.47	6864.14	TYPE I MH
264.52	30	27.1	4.906	5.52	409	0.004386	0.00				0.00	0.00	0.00	0.10		0.02	6864.63	0.42	6864.21	
269.52	30	25.6	4.906	5.22	409	0.003914	5.00				0.02		0.00			0.00	6864.63	0.42	6864.21	END MH
269.52	30	25.6	4.906	5.22	409	0.003914	0.00				0.00	0.00	0.00			0.27	6865.57	0.42	6865.15	
338.65	30	25.6	4.906	5.22	409	0.003914	69.13				0.27		0.00			0.05	6865.62	0.42	6865.20	12 HZ BEND
338.65	30	25.6	4.906	5.22	409	0.003914	0.00			0.13	0.00	0.05	0.00			0.57	6866.30	0.42	6865.88	
484.71	30	25.6	4.906	5.22	409	0.003914	146.06				0.57		0.00			0.06	6866.36	0.42	6865.94	14 HZ BEND
484.71	30	25.6	4.906	5.22	409	0.003914	0.00			0.15	0.00	0.06	0.00			0.25	6866.61	0.42	6866.19	
548.84	30	25.6	4.906	5.22	409	0.003914	64.13				0.25		0.00			0.08	6866.69	0.42	6866.27	20 HZ BEND
548.84	30	25.6	4.906	5.22	409	0.003914	0.00			0.19	0.00	0.08	0.00			0.52	6867.29	0.42	6866.87	
681.86	30	25.6	4.906	5.22	409	0.003914	133.02				0.52		0.00			2.58	6869.87	1.03	6868.84	TYPE I MH
681.86	24	25.6	3.140	8.15	226	0.012887	0.00				0.00	0.00	0.00	2.58		0.06	6869.93	1.03	6868.90	
686.86	24	25.6	3.140	8.15	226	0.012887	5.00				0.06		0.00			0.00	6869.93	1.03	6868.90	END MH
686.86	24	25.6	3.140	8.15	226	0.012887	0.00				0.00	0.00	0.00			0.65	6870.58	1.03	6869.55	
737.04	24	25.6	3.140	8.15	226	0.012887	50.18				0.65		0.00			2.58	6873.16	1.03	6872.13	10' SUMP
737.04	24	25.6	3.140	8.15	226	0.012887	0.00				0.00	0.00	0.00	2.58		0.08	6873.24	1.03	6872.21	
743.04	24	25.6	3.140	8.15	226	0.012887	6.00				0.08		0.00			0.00	6873.24	1.03	6872.21	END INLET
743.04	24	25.6	3.140	8.15	226	0.012887	0.00				0.00	0.00	0.00			0.12	6873.36	0.28	6873.08	
777.38	24	13.3	3.140	4.24	226	0.003478	34.34				0.12		0.00			0.42	6873.78	0.28	6873.50	10' SUMP
777.38	24	13.3	3.140	4.24	226	0.003478	0.00				0.00	0.00	0.00	0.42						

MANNINGS n = 0.013

FIL 2B MAIN 'A' (TO THE EAST)

100 YR. STORM

HGL CALCULATION

3/11/2016 14:52

STATION	PIPE SIZE (inches)	PEAK RATE (cfs)	AREA (sf)	VELOCITY (fps)	CONV. K	FRICTION SLOPE (ft/ft)	JUNCTION DATA LENGTH (ft)	JUNCTION DATA LATERAL SIZE (inches)	JUNCTION DATA LATERAL ANGLE (degrees)	BEND LOSS K	FRICTION LOSS (ft)	BEND LOSS (ft)	JUNCTION LOSS (ft)	M.H. LOSS (ft)	ENTRANCE LOSS (ft)	TOTAL LOSS (ft)	ENERGY GRADE LINE (elevation)	VELOCITY HEAD (ft)	HYDRAULIC GRADE LINE (elevation)	
																	6862.73			
100	30	30.6																		
100	30	30.6	4.906	6.24	409	0.005593	0.00				0.00					0.00	6862.73	0.60	6862.13	BEGIN MH
125.93	30	30.6	4.906	6.24	409	0.005593	25.93				0.15		0.00			0.15	6862.88	0.60	6862.27	
125.93	30	30.6	4.906	6.24	409	0.005593	0.00			0.35	0.00	0.21	0.00			0.21	6863.09	0.60	6862.48	HZ BEND
146.62	30	30.6	4.906	6.24	409	0.005593	20.69				0.12	0.00	0.00			0.12	6863.20	0.60	6862.60	
146.62	30	5.2	4.906	1.06	409	0.000161	0.00	30	45		0.00	0.00	-0.002			0.00	6863.20	0.02	6863.18	30" WYE
157.82	30	5.2	4.906	1.06	409	0.000161	11.20				0.00		0.00			0.00	6863.20	0.02	6863.18	
157.82	30	5.2	4.906	1.06	409	0.000161	0.00				0.00	0.00	0.00			0.00	6863.20	0.02	6863.18	BEGIN REDUCER
165.82	24	5.2	3.140	1.66	226	0.000532	8.00				0.00		0.00			0.00	6863.21	0.04	6863.16	
165.82	24	5.2	3.140	1.66	226	0.000532	0.00				0.00	0.00	0.00			0.00	6863.21	0.04	6863.16	END REDUCER
180.92	24	5.2	3.140	1.66	226	0.000532	15.10				0.01		0.00			0.01	6863.21	0.04	6863.17	
180.92	24	5.2	3.140	1.66	226	0.000532	0.00				0.00	0.00	0.00	0.06		0.06	6863.28	0.04	6863.24	5' INLET

MANNINGS n = 0.013

FIL 2B - LAT D

100 YR. STORM

HGL CALCULATION

3/11/2016 14:52

STATION	PIPE SIZE (inches)	PEAK RATE (cfs)	AREA (sf)	VELOCITY (fps)	CONV. K	FRICTION SLOPE (ft/ft)	JUNCTION DATA LENGTH (ft)	JUNCTION DATA LATERAL SIZE (inches)	JUNCTION DATA LATERAL ANGLE (degrees)	BEND LOSS K	FRICTION LOSS (ft)	BEND LOSS (ft)	JUNCTION LOSS (ft)	M.H. LOSS (ft)	ENTRANCE LOSS (ft)	TOTAL LOSS (ft)	ENERGY GRADE LINE (elevation)	VELOCITY HEAD (ft)	HYDRAULIC GRADE LINE (elevation)	
																	6841.36			
100	18	2.2																		
100	18	2.2	1.766	1.25	105	0.000442	0.00				0.00	0.00				0.00	6841.36	0.02	6841.34	MH
154.12	18	2.2	1.766	1.25	105	0.000442	54.12				0.02	0.00	0.00			0.02	6841.38	0.02	6841.36	
154.12	18	2.2	1.766	1.25	105	0.000442	0.00				0.00	0.00	0.00	0.04		0.04	6841.42	0.02	6841.40	TYPE D INLET

MANNINGS n = 0.013

FIL 2B LAT E

100 YR. STORM

HGL CALCULATION

3/11/2016 14:52

STATION	PIPE SIZE (inches)	PEAK RATE (cfs)	AREA (sf)	VELOCITY (fps)	CONV. K	FRICTION SLOPE (ft/ft)	JUNCTION DATA LENGTH (ft)	JUNCTION DATA LATERAL SIZE (inches)	JUNCTION DATA LATERAL ANGLE (degrees)	BEND LOSS K	FRICTION LOSS (ft)	BEND LOSS (ft)	JUNCTION LOSS (ft)	M.H. LOSS (ft)	ENTRANCE LOSS (ft)	TOTAL LOSS (ft)	ENERGY GRADE LINE (elevation)	VELOCITY HEAD (ft)	HYDRAULIC GRADE LINE (elevation)	
																	6863.52			
100	24	15.8																		
100	24	15.8	3.140	5.03	226	0.004909	0.00				0.00	0.00				0.00	6863.52	0.39	6863.13	36" X 24" WYE
124.99	24	15.8	3.140	5.03	226	0.004909	24.99				0.12	0.00	0.00			0.12	6864.10	0.39	6863.71	
124.99	24	15.8	3.140	5.03	226	0.004909	0.00			0.35	0.00	0.14	0.00			0.14	6864.24	0.39	6863.84	45 HZ
136.99	24	15.8	3.140	5.03	226	0.004909	12.00				0.06	0.00	0.00			0.06	6864.66	0.39	6864.27	
136.99	24	15.8	3.140	5.03	226	0.004909	0.00				0.00	0.00	0.00	0.58974		0.59	6865.25	0.39	6864.86	INLET

MANNINGS n = 0.013

FIL 2B LAT F

100 YR. STORM

HGL CALCULATION

3/11/2016 14:52

STATION	PIPE SIZE (inches)	PEAK RATE (cfs)	AREA (sf)	VELOCITY (fps)	CONV. K	FRICTION SLOPE (ft/ft)	JUNCTION DATA LENGTH (ft)	JUNCTION DATA LATERAL SIZE (inches)	JUNCTION DATA LATERAL ANGLE (degrees)	BEND LOSS K	FRICTION LOSS (ft)	BEND LOSS (ft)	JUNCTION LOSS (ft)	M.H. LOSS (ft)	ENTRANCE LOSS (ft)	TOTAL LOSS (ft)	ENERGY GRADE LINE (elevation)	VELOCITY HEAD (ft)	HYDRAULIC GRADE LINE (elevation)	
																	6862.80			
100	18	3.5																		
100	18	3.5	1.766	1.98	105	0.001119	0.00				0.00	0.00				0.00	6862.80	0.06	6862.74	36" X 18" WYE
110.14	18	3.5	1.766	1.98	105	0.001119	10.14				0.01	0.00	0.00			0.01	6864.10	0.06	6864.04	
110.14	18	3.5	1.766	1.98	105	0.001119	0.00			0.35	0.00	0.02	0.00			0.02	6864.12	0.06	6864.06	45 HZ
119.86	18	3.5	1.766	1.98	105	0.001119	9.72				0.01	0.00	0.00			0.01	6864.66	0.06	6864.60	
119.86	18	3.5	1.766	1.98	105	0.001119	0.00				0.00	0.00	0.00	0.091461		0.09	6864.75	0.06	6864.69	INLET

MANNINGS n = 0.013

FIL 2B - LAT G

100 YR. STORM

HGL CALCULATION

3/11/2016 14:52

STATION	PIPE SIZE (inches)	PEAK RATE (cfs)	AREA (sf)	VELOCITY (fps)	CONV. K	FRICTION SLOPE (ft/ft)	JUNCTION DATA LENGTH (ft)	JUNCTION DATA LATERAL SIZE (inches)	JUNCTION DATA LATERAL ANGLE (degrees)	BEND LOSS K	FRICTION LOSS (ft)	BEND LOSS (ft)	JUNCTION LOSS (ft)	M.H. LOSS (ft)	ENTRANCE LOSS (ft)	TOTAL LOSS (ft)	ENERGY GRADE LINE (elevation)	VELOCITY HEAD (ft)	HYDRAULIC GRADE LINE (elevation)	
																	6863.61			
100	30	25.9									0.00	0.00				0.00	6863.61	0.43	6863.18	MH
100	30	25.9	4.906	5.28	409	0.004006	0.00				0.21	0.00	0.00			0.21	6863.98	0.43	6863.55	
152.1	30	25.9	4.906	5.28	409	0.004006	52.10				0.00	0.00	0.00	0.65		0.65	6864.63	0.43	6864.20	TYPE D INLET
152.1	30	25.9	4.906	5.28	409	0.004006	0.00													

MANNINGS n = 0.013

FIL 2B 48" BYPASS MAIN

100 YR. STORM

HGL CALCULATION

3/11/2016 14:52

STATION	PIPE SIZE (inches)	PEAK RATE (cfs)	AREA (sf)	VELOCITY (fps)	CONV. K	FRICTION SLOPE (ft/ft)	JUNCTION DATA LENGTH (ft)	JUNCTION DATA LATERAL SIZE (inches)	JUNCTION DATA LATERAL ANGLE (degrees)	BEND LOSS K	FRICTION LOSS (ft)	BEND LOSS (ft)	JUNCTION LOSS (ft)	M.H. LOSS (ft)	ENTRANCE LOSS (ft)	TOTAL LOSS (ft)	ENERGY GRADE LINE (elevation)	VELOCITY HEAD (ft)	HYDRAULIC GRADE LINE (elevation)	
																	6857.57			
100	48	176.5									0.00					0.00	6857.57	3.07	6854.50	FES
100	48	176.5	12.560	14.05	1435	0.015124	0.00				1.16		0.00			1.16	6858.73	3.07	6855.67	
176.88	48	176.5	12.560	14.05	1435	0.015124	76.88				0.00	1.20	0.00			1.20	6859.93	3.07	6856.86	45 HZ BEND
176.88	48	176.5	12.560	14.05	1435	0.015124	0.00			0.39	1.66	0.00	0.00			1.66	6865.93	3.07	6862.86	
286.4	48	176.5	12.560	14.05	1435	0.015124	109.52				0.00	1.20	0.000			1.20	6867.13	3.07	6864.06	45 HZ BEND
286.4	48	176.5	12.560	14.05	1435	0.015124	0.00			0.39	0.83		0.00			0.83	6867.95	3.07	6864.89	
341.09	48	176.5	12.560	14.05	1435	0.015124	54.69				0.00	0.00	0.00	0.15		0.15	6868.11	3.07	6865.04	CL TYPE III MH
341.09	48	176.5	12.560	14.05	1435	0.015124	0.00				3.62		0.00			3.62	6875.96	3.07	6872.89	
580.6	48	176.5	12.560	14.05	1435	0.015124	239.51				0.00	0.61	0.00			0.61	6876.57	3.07	6873.51	22 HZ BEND
580.6	48	176.5	12.560	14.05	1435	0.015124	0.00			0.2	2.49		0.00			2.49	6879.70	3.07	6876.63	
745.53	48	176.5	12.560	14.05	1435	0.015124	164.93				0.00	1.07	0.00			1.07	6880.77	3.07	6877.71	45 HZ BEND
745.53	48	176.5	12.560	14.05	1435	0.015124	0.00			0.35	0.32		0.00			0.32	6881.09	3.07	6878.02	
766.51	48	176.5	12.560	14.05	1435	0.015124	20.98				0.00	0.00	0.00	0.15		0.15	6881.24	3.07	6878.18	CL TYPE III MH
766.51	48	176.5	12.560	14.05	1435	0.015124	0.00				2.74		0.00			2.74	6883.99	3.07	6880.92	
947.83	48	176.5	12.560	14.05	1435	0.015124	181.32				0.00	0.58	0.00			0.58	6884.57	3.07	6881.50	CONNECT W/18 HZ
947.83	48	176.5	12.560	14.05	1435	0.015124	0.00			0.19	0.68		0.00			0.68	6885.25	3.07	6882.18	
992.93	48	176.5	12.560	14.05	1435	0.015124	45.10				0.00	0.58	0.00	0.15		0.74	6885.99	3.07	6882.92	EXISTING MH
992.93	48	176.5	12.560	14.05	1435	0.015124	0.00			0.19										

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*12/16/15*
CALCULATED BY:	*MAL*

DESIGN POINT 3

Total Flow: Q_5 = 3.5 cfs

Q_{100} = 8.4 cfs

Maximum allowable ponding depth at sump:

D_5 = 0.50

D_{100} = 0.65 (dmax)

Qi = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: [4] foot inlet required

100-Year Event: [4] foot inlet required

EXISTING (FILING 1) [5] FT Type-R INLET TO ACCEPT BOTH 5YR & 100 YR DEVELOPED FLOWS AT THIS DESIGN POINT.

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*12/16/15*
CALCULATED BY:	*MAL*

DESIGN POINT **4**

Total Flow: Q_5 = 0.6 cfs

Q_{100} = 1.1 cfs

Maximum allowable ponding depth at sump:

D_5 = 0.50

D_{100} = 0.65 (dmax)

Qi = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: [4] foot inlet required

100-Year Event: [4] foot inlet required

EXISTING (FILING 1) [5] FT Type-R INLET TO ACCEPT BOTH 5YR & 100 YR DEVELOPED FLOWS AT THIS DESIGN POINT.

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*12/16/15*
CALCULATED BY:	*MAL*

DESIGN POINT 5 **100 YEAR FLOW**

Q(100)	9.3	I(100)	6.4		
DEPTH	0.31	Fr	2.21	Inlet size ? L(i) =	15
SPREAD	9.0	L(1)	15.3	If Li < L(2) then Qi =	9
CROSS SLOPE	2.0%	L(2)	9.2	If Li > L(2) then Qi =	7
STREET SLOPE	3.5%	L(3)	32.8	FB =	3
				CA(eqv.)=	0.39

5 YEAR FLOW

Q(5)	3.3	I(5)	3.8		
DEPTH	0.23	Fr	1.94	Inlet size ? L(i) =	15
SPREAD	5.3	L(1)	7.9	If Li < L(2) then Qi =	6
CROSS SLOPE	2.0%	L(2)	4.7	If Li > L(2) then Qi =	3
STREET SLOPE	3.5%	L(3)	16.8	FB =	0
				CA(eqv.)=	0.04

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*12/16/15*
CALCULATED BY:	*MAL*

DESIGN POINT 6

Total Flow: Q_5 = 5.2 cfs

Q_{100} = 14.3 cfs

Maximum allowable ponding depth at sump:

D_5 = 0.50

D_{100} = 0.65 (dmax)

Qi = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: [4] foot inlet required

100-Year Event: [6] foot inlet required

INSTALL PROPOSED [10] FT Type-R INLET TO ACCEPT BOTH 5YR & 100 YR DEVELOPED FLOWS AT THIS DESIGN POINT.

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*12/16/15*
CALCULATED BY:	*MAL*

DESIGN POINT 7

Total Flow: Q_5 = 6.5 cfs

Q_{100} = 13.3 cfs

Maximum allowable ponding depth at sump:

D_5 = 0.50

D_{100} = 0.65 (dmax)

Qi = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: [4] foot inlet required

100-Year Event: [4] foot inlet required

INSTALL PROPOSED [10] FT Type-R INLET TO ACCEPT BOTH 5YR & 100 YR DEVELOPED FLOWS AT THIS DESIGN POINT.

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*12/16/15*
CALCULATED BY:	*MAL*

DESIGN POINT **9**

Total Flow: Q_5 = 7.6 cfs

Q_{100} = 15.8 cfs

Maximum allowable ponding depth at sump:

D_5 = 0.50

D_{100} = 0.65 (dmax)

Qi = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: [4] foot inlet required

100-Year Event: [6] foot inlet required

INSTALL PROPOSED [10] FT Type-R INLET TO ACCEPT BOTH 5YR & 100 YR DEVELOPED FLOWS AT THIS DESIGN POINT.

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*12/16/15*
CALCULATED BY:	*MAL*

DESIGN POINT 10

Total Flow: Q_5 = 1.8 cfs

Q_{100} = 3.5 cfs

Maximum allowable ponding depth at sump:

D_5 = 0.50

D_{100} = 0.65 (dmax)

Qi = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: [4] foot inlet required

100-Year Event: [4] foot inlet required

INSTALL PROPOSED [5] FT Type-R INLET TO ACCEPT BOTH 5YR & 100 YR DEVELOPED FLOWS AT THIS DESIGN POINT.

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*12/16/15*
CALCULATED BY:	*MAL*

DESIGN POINT 11

Total Flow: Q_5 = 4.3 cfs

Q_{100} = 10.8 cfs

Maximum allowable ponding depth at sump:

D_5 = 0.50

D_{100} = 0.65 (dmax)

Qi = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: 4 foot inlet required

100-Year Event: 4 foot inlet required

EXISTING (FILING 1) 5 FT Type-R INLET TO ACCEPT BOTH 5YR & 100 YR DEVELOPED FLOWS AT THIS DESIGN POINT.

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*12/16/15*
CALCULATED BY:	*MAL*

DESIGN POINT 12

Total Flow: Q_5 = 2.2 cfs

Q_{100} = 4.9 cfs

Maximum allowable ponding depth at sump:

D_5 = 0.50

D_{100} = 0.65 (dmax)

Qi = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: [4] foot inlet required

100-Year Event: [4] foot inlet required

EXISTING (FILING 1) [5] FT Type-R INLET TO ACCEPT BOTH 5YR & 100 YR DEVELOPED FLOWS AT THIS DESIGN POINT.

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*12/16/15*
CALCULATED BY:	*MAL*

DESIGN POINT 13

Total Flow: Q_5 = 11.3 cfs

Q_{100} = 25.9 cfs

Maximum allowable ponding depth at sump:

D_5 = 0.50

D_{100} = 0.65 (dmax)

Qi = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: [6] foot inlet required

100-Year Event: [14] foot inlet required

INSTALL PROPOSED [15] FT Type-R INLET TO ACCEPT BOTH 5YR & 100 YR DEVELOPED FLOWS AT THIS DESIGN POINT.

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*12/16/15*
CALCULATED BY:	*MAL*

DESIGN POINT 14

Total Flow: Q_5 = 2.6 cfs

Q_{100} = 5.2 cfs

Maximum allowable ponding depth at sump:

D_5 = 0.50

D_{100} = 0.65 (dmax)

Qi = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: [4] foot inlet required

100-Year Event: [4] foot inlet required

INSTALL PROPOSED [5] FT Type-R INLET TO ACCEPT BOTH 5YR & 100 YR DEVELOPED FLOWS AT THIS DESIGN POINT.

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*12/16/15*
CALCULATED BY:	*MAL*

DESIGN POINT 17

Total Flow: Q_5 = 5.2 cfs

Q_{100} = 10.5 cfs

Maximum allowable ponding depth at sump:

D_5 = 0.50

D_{100} = 0.65 (dmax)

Qi = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: 4 foot inlet required

100-Year Event: 4 foot inlet required

INSTALL PROPOSED 5 FT Type-R INLET TO ACCEPT BOTH 5YR & 100 YR DEVELOPED FLOWS AT THIS DESIGN POINT.

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*12/16/15*
CALCULATED BY:	*MAL*

DESIGN POINT 18

Total Flow: Q_5 = 1.8 cfs

Q_{100} = 3.6 cfs

Maximum allowable ponding depth at sump:

D_5 = 0.50

D_{100} = 0.65 (dmax)

Qi = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: 4 foot inlet required

100-Year Event: 4 foot inlet required

INSTALL PROPOSED 5 FT Type-R INLET TO ACCEPT BOTH 5YR & 100 YR DEVELOPED FLOWS AT THIS DESIGN POINT.

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*12/16/15*
CALCULATED BY:	*MAL*

DESIGN POINT **19** **100 YEAR FLOW**

Q(100)	8.2	I(100)	7.4		
DEPTH	0.32	Fr	2.07	Inlet size ? L(i) =	10
SPREAD	9.5	L(1)	15.1	If Li < L(2) then Qi =	5
CROSS SLOPE	2.0%	L(2)	9.1	If Li > L(2) then Qi =	5
STREET SLOPE	3.0%	L(3)	32.4	FB =	3.1
				CA(eqv.)=	0.41

5 YEAR FLOW

Q(5)	3.8	I(5)	4.4		
DEPTH	0.26	Fr	1.92	Inlet size ? L(i) =	10
SPREAD	6.8	L(1)	10.0	If Li < L(2) then Qi =	4
CROSS SLOPE	2.0%	L(2)	6.0	If Li > L(2) then Qi =	3
STREET SLOPE	3.0%	L(3)	21.3	FB =	1.0
				CA(eqv.)=	0.23

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*12/16/15*
CALCULATED BY:	*MAL*

DESIGN POINT 21

Total Flow: Q_5 = 18.1 cfs

Q_{100} = 40.3 cfs

Maximum allowable ponding depth at sump:

D_5 = 0.50

D_{100} = 0.83 (dmax)

Qi = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: 12 foot inlet required

100-Year Event: 16 foot inlet required

INSTALL PROPOSED 20 FT Type-R INLET TO ACCEPT BOTH 5YR & 100 YR DEVELOPED FLOWS AT THIS DESIGN POINT.

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*12/16/15*
CALCULATED BY:	*MAL*

DESIGN POINT 22

Total Flow: Q_5 = 2.8 cfs

Q_{100} = 5.5 cfs

Maximum allowable ponding depth at sump:

D_5 = 0.50

D_{100} = 0.83 (dmax)

Qi = 1.7(Li+1.8(W))(dmax + w/12)^1.85

Clogging Factor = 1.25

Li (1.25) = Length of inlet opening

5-Year Event: 4 foot inlet required

100-Year Event: 4 foot inlet required

INSTALL PROPOSED 10 FT Type-R INLET TO ACCEPT BOTH 5YR & 100 YR DEVELOPED FLOWS AT THIS DESIGN POINT.

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*12/16/15*
CALCULATED BY:	*MAL*

DESIGN POINT **25** **100 YEAR FLOW**

Q(100)	15.4	I(100)	7.2		
DEPTH	0.39	Fr	2.38	Inlet size ? L(i) =	15
SPREAD	13.0	L(1)	23.8	If Li < L(2) then Qi =	10
CROSS SLOPE	2.0%	L(2)	14.3	If Li > L(2) then Qi =	9
STREET SLOPE	3.5%	L(3)	51.1	FB =	6
				CA(eqv.)=	0.83

5 YEAR FLOW

Q(5)	6.9	I(5)	4.3		
DEPTH	0.30	Fr	2.19	Inlet size ? L(i) =	15
SPREAD	8.8	L(1)	14.8	If Li < L(2) then Qi =	7
CROSS SLOPE	2.0%	L(2)	8.9	If Li > L(2) then Qi =	5
STREET SLOPE	3.5%	L(3)	31.7	FB =	2
				CA(eqv.)=	0.42

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*12/16/15*
CALCULATED BY:	*MAL*

DESIGN POINT **26-EX** **100 YEAR FLOW**

Q(100)	16.1	I(100)	7.2		
DEPTH	0.39	Fr	2.38	Inlet size ? L(i) =	15
SPREAD	13.0	L(1)	23.8	If Li < L(2) then Qi =	10
CROSS SLOPE	2.0%	L(2)	14.3	If Li > L(2) then Qi =	10
STREET SLOPE	3.5%	L(3)	51.1	FB =	6
				CA(eqv.)=	0.87

5 YEAR FLOW

Q(5)	8.1	I(5)	4.3		
DEPTH	0.30	Fr	2.19	Inlet size ? L(i) =	15
SPREAD	8.8	L(1)	14.8	If Li < L(2) then Qi =	8
CROSS SLOPE	2.0%	L(2)	8.9	If Li > L(2) then Qi =	6
STREET SLOPE	3.5%	L(3)	31.7	FB =	2
				CA(eqv.)=	0.49

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*12/16/15*
CALCULATED BY:	*MAL*

DESIGN POINT **26-DEV** **100 YEAR FLOW**

Q(100)	6.8	I(100)	8.5		
DEPTH	0.30	Fr	2.18	Inlet size ? L(i) =	15
SPREAD	8.5	L(1)	14.3	If Li < L(2) then Qi =	7
CROSS SLOPE	2.0%	L(2)	8.6	If Li > L(2) then Qi =	5
STREET SLOPE	3.5%	L(3)	30.6	FB =	2
				CA(eqv.)=	0.20

5 YEAR FLOW

Q(5)	3.6	I(5)	5.0		
DEPTH	0.24	Fr	1.99	Inlet size ? L(i) =	15
SPREAD	5.8	L(1)	8.8	If Li < L(2) then Qi =	6
CROSS SLOPE	2.0%	L(2)	5.3	If Li > L(2) then Qi =	3
STREET SLOPE	3.5%	L(3)	18.9	FB =	0
				CA(eqv.)=	0.06

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*12/16/15*
CALCULATED BY:	*MAL*

DESIGN POINT **27** **100 YEAR FLOW**

Q(100)	6.0	I(100)	7.2		
DEPTH	0.30	Fr	2.18	Inlet size ? L(i) =	15
SPREAD	8.5	L(1)	14.3	If Li < L(2) then Qi =	6
CROSS SLOPE	2.0%	L(2)	8.6	If Li > L(2) then Qi =	4
STREET SLOPE	3.5%	L(3)	30.6	FB =	1
				CA(eqv.)=	0.21

5 YEAR FLOW

Q(5)	1.8	I(5)	4.3		
DEPTH	0.20	Fr	1.75	Inlet size ? L(i) =	15
SPREAD	3.8	L(1)	5.1	If Li < L(2) then Qi =	5
CROSS SLOPE	2.0%	L(2)	3.0	If Li > L(2) then Qi =	2
STREET SLOPE	3.5%	L(3)	10.8	FB =	0
				CA(eqv.)=	-0.06

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*12/16/15*
CALCULATED BY:	*MAL*

DESIGN POINT **28-EX** **100 YEAR FLOW**

Q(100)	6.3	I(100)	7.2		
DEPTH	0.30	Fr	2.18	Inlet size ? L(i) =	15
SPREAD	8.5	L(1)	14.3	If Li < L(2) then Qi =	7
CROSS SLOPE	2.0%	L(2)	8.6	If Li > L(2) then Qi =	5
STREET SLOPE	3.5%	L(3)	30.6	FB =	2
				CA(eqv.)=	0.22

5 YEAR FLOW

Q(5)	2.1	I(5)	4.3		
DEPTH	0.20	Fr	1.75	Inlet size ? L(i) =	15
SPREAD	3.8	L(1)	5.1	If Li < L(2) then Qi =	6
CROSS SLOPE	2.0%	L(2)	3.0	If Li > L(2) then Qi =	2
STREET SLOPE	3.5%	L(3)	10.8	FB =	0
				CA(eqv.)=	-0.07

JOB NAME:	*FOREST LAKES FILING NO. 2*
JOB NUMBER:	*1175.02*
DATE:	*12/16/15*
CALCULATED BY:	*MAL*

DESIGN POINT **28-DEV** **100 YEAR FLOW**

Q(100)	1.7	I(100)	8.5		
DEPTH	0.20	Fr	1.71	Inlet size ? L(i) =	15
SPREAD	3.5	L(1)	4.6	If Li < L(2) then Qi =	5
CROSS SLOPE	2.0%	L(2)	2.8	If Li > L(2) then Qi =	2
STREET SLOPE	3.5%	L(3)	9.9	FB =	0
				CA(eqv.)=	-0.04

5 YEAR FLOW

Q(5)	0.3	I(5)	5.0		
DEPTH	0.18	Fr	1.52	Inlet size ? L(i) =	15
SPREAD	2.8	L(1)	3.2	If Li < L(2) then Qi =	1
CROSS SLOPE	2.0%	L(2)	1.9	If Li > L(2) then Qi =	0
STREET SLOPE	3.5%	L(3)	6.9	FB =	0
				CA(eqv.)=	-0.02

DETENTION POND "A"

CLASSIC SM
CONSULTING
ENGINEERS & SURVEYORS

JOB NAME: FOREST LAKES FILING 2
JOB NUMBER: 1175.02
DATE: 12/16/15
CALCULATED BY: MAL

POND A TO SPILLWAY

POND SIZING WITH PONDPACK EQUATION:
INSERT POND DESIGN SIZE INFO: (RED)

POND ELEVATION : (from lowest to highest)
6851.50
6851.50
6852.00
6854.00
6856.00
6858.00
6859.00

AREA (BTM to TOP):		
	-	acres
500	0.011	acres
3,245	0.074	acres
9,842	0.226	acres
12,645	0.290	acres
15,788	0.362	acres
17,532	0.402	acres
	-	acres
	-	acres
	-	acres
	-	acres
	-	acres

PRELIMINARY SIZE:

VOLUME = 1/3{(EL2-EL1)*(A1+A2+((A1*A2)^.5))}

							CUMMULATIVE VOLUME:
-	AC-FT	from	6,852	to	6,852		
0.02	AC-FT	from	6,852	to	6,852		0.02
0.28	AC-FT	from	6,852	to	6,854		0.30
0.51	AC-FT	from	6,854	to	6,856		0.81
0.64	AC-FT	from	6,856	to	6,858		1.46
0.38	AC-FT	from	6,858	to	6,859		1.84
-	AC-FT	from	6,859	to	-		1.84
-	AC-FT	from	-	to	-		1.84
-	AC-FT	from	-	to	-		1.84
-	AC-FT	from	-	to	-		1.84
-	AC-FT	from	-	to	-		1.84

*SIZING IS FOR PRELIMINARY PURPOSES ONLY.

VOLUME = 1.84 AC-FT

APPROXIMATE SURFACE AREA REQUIREMENT

POND DEPTH (FT)	POND VOLUME AC-FT		CF	SURFACE AREA (SF)
4	1.84	=	79,976	19,994
6	1.84	=	79,976	13,329
8	1.84	=	79,976	9,997
10	1.84	=	79,976	7,998

JOB NAME: FOREST LAKES FILING 2
JOB NUMBER: 1175.02
DATE: 12/16/15
CALCULATED BY: MAL

POND A EURV (TOP OF BOX)

POND SIZING WITH PONDPACK EQUATION:
INSERT POND DESIGN SIZE INFO: (RED)

POND ELEVATION : (from lowest to highest)
6851.50
6851.50
6852.00
6854.00
6856.00
6857.85

AREA (BTM to TOP):		
	-	acres
500	0.01	acres
3,245	0.07	acres
9,842	0.23	acres
12,645	0.29	acres
15,549	0.357	acres
	-	acres
	-	acres
	-	acres
	-	acres
	-	acres
	-	acres

PRELIMINARY SIZE:

VOLUME = 1/3{(EL2-EL1)*(A1+A2+((A1*A2)^.5))}

							CUMMULATIVE VOLUME:
-	AC-FT	from	6,852	to	6,852		
0.02	AC-FT	from	6,852	to	6,852		0.02
0.28	AC-FT	from	6,852	to	6,854		0.30
0.51	AC-FT	from	6,854	to	6,856		0.81
0.59	AC-FT	from	6,856	to	6,858		1.40
-	AC-FT	from	6,858	to	-		1.40
-	AC-FT	from	-	to	-		1.40
-	AC-FT	from	-	to	-		1.40
-	AC-FT	from	-	to	-		1.40
-	AC-FT	from	-	to	-		1.40
-	AC-FT	from	-	to	-		1.40

*SIZING IS FOR PRELIMINARY PURPOSES ONLY.

VOLUME = 1.40 AC-FT

APPROXIMATE SURFACE AREA REQUIREMENT

POND DEPTH (FT)	POND VOLUME AC-FT		CF	SURFACE AREA (SF)
4	1.40	=	61,172	15,293
6	1.40	=	61,172	10,195
8	1.40	=	61,172	7,647
10	1.40	=	61,172	6,117

JOB NAME: FOREST LAKES FILING 2
JOB NUMBER: 1175.02
DATE: 12/16/15
CALCULATED BY: MAL

POND A FOREBAY

POND SIZING WITH PONDPACK EQUATION:
INSERT POND DESIGN SIZE INFO: (RED)

POND ELEVATION : (from lowest to highest)
6853.00
6853.00
6854.50

AREA (BTM to TOP):		
	-	acres
345	0.008	acres
582	0.013	acres
	-	acres
	-	acres
	-	acres
	-	acres
	-	acres
	-	acres
	-	acres
	-	acres
	-	acres

PRELIMINARY SIZE:

VOLUME = 1/3{(EL2-EL1)*(A1+A2+((A1*A2)^.5))}

						CUMMULATIVE VOLUME:
-	AC-FT	from	6,853	to	6,853	
0.02	AC-FT	from	6,853	to	6,855	0.02
-	AC-FT	from	6,855	to	-	0.02
-	AC-FT	from	-	to	-	0.02
-	AC-FT	from	-	to	-	0.02
-	AC-FT	from	-	to	-	0.02
-	AC-FT	from	-	to	-	0.02
-	AC-FT	from	-	to	-	0.02
-	AC-FT	from	-	to	-	0.02
-	AC-FT	from	-	to	-	0.02
-	AC-FT	from	-	to	-	0.02

*SIZING IS FOR PRELIMINARY PURPOSES ONLY.

VOLUME = 0.016 AC-FT

APPROXIMATE SURFACE AREA REQUIREMENT

POND DEPTH (FT)	POND VOLUME AC-FT		CF	SURFACE AREA (SF)
4	0.02	=	681	170
6	0.02	=	681	113
8	0.02	=	681	85
10	0.02	=	681	68

Design Procedure Form: Extended Detention Basin (EDB)

Designer: Matt Larson
Company: Classic Consulting
Date: December 15, 2015
Project: Forest Lakes Filing 2
Location: Pond A (Filing 2B)

1. Basin Storage Volume	
A) Effective Imperviousness of Tributary Area, I_a	I_a = 55.9 %
B) Tributary Area's Imperviousness Ratio (i = I_a / 100)	i = 0.559
C) Contributing Watershed Area	Area = 22.820 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}= 0.509 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))	$V_{DESIGN\ OTHER}$= 0.497 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 = 1.407 ac-f t
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 = 3.00 ft / ft DIFFICULT TO MAINTAIN, INCREASE WHERE POSSIBLE
4. Inlet A) Describe means of providing energy dissipation at concentrated inflow locations:	Concrete forebay box

Design Procedure Form: Extended Detention Basin (EDB)

Designer:	Matt Larson
Company:	Classic Consulting
Date:	December 15, 2015
Project:	Forest Lakes Filing 2
Location:	Pond A (Filing 2B)

5. Forebay	
A) Minimum Forebay Volume (V_{FMIN} = 3% of the WQCV)	V_{FMIN} = 0.012 ac-ft
B) Actual Forebay Volume	V_F = 0.016 ac-ft
C) Forebay Depth (D_F = 18 inch maximum)	D_F = 18.0 in
D) Forebay Discharge	
i) Undetained 100-year Peak Discharge	Q_{100} = 83.50 cfs
ii) Forebay Discharge Design Flow ($Q_F = 0.02 * Q_{100}$)	Q_F = 1.67 cfs
E) Forebay Discharge Design	Choose One: ○Berm With Pipe ◉Wall with Rect. Notch ○Wall with V-Notch Weir (flow too small for berm w/ pipe)
G) Rectangular Notch Width	Calculated W_N = 6.9 in
6. Trickle Channel	
A) Type of Trickle Channel	Choose One: ◉Concrete ○Soft Bottom
F) Slope of Trickle Channel	S = 0.0100 ft / ft
7. Micropool and Outlet Structure	
A) Depth of Micropool (2.5-feet minimum)	D_M = 2.5 ft
B) Surface Area of Micropool ($10 ft^2$ minimum)	A_M = 531 sq ft
C) Outlet Type	Choose One: ◉Orifice Plate ○Other (Describe):
D) Depth of Design Volume (EURV or 1.2 WQCV) Based on the Design Concept Chosen Under 1.E.	H = 6.35 feet
E) Volume to Drain Over Prescribed Time	EURV = 1.407 ac-ft
F) Drain Time (Min T_D for WQCV= 40 hours; Max T_D for EURV= 72 hours)	T_D = 72 hours
G) Recommended Maximum Outlet Area per Row, (A_o)	A_o = 0.73 square inches
H) Orifice Dimensions: i) Circular Orifice Diameter or	$D_{orifice}$ = 15 / 16 inches
I) Number of Columns	n_c = 1 number
J) Actual Design Outlet Area per Row (A_o)	A_o = 0.69 square inches
K) Number of Rows (nr)	n_r = 19 number
L) Total Outlet Area (A_{ot})	A_{ot} = 13.2 square inches
M) Depth of WQCV (H_{WQCV}) (Estimate using actual stage-area-volume relationship and V_{WQCV})	H_{WQCV} = feet
N) Ensure Minimum 40 Hour Drain Time for WQCV	$T_{D\ WQCV}$ = hours

Design Procedure Form: Extended Detention Basin (EDB)

Designer: Matt Larson
Company: Classic Consulting
Date: December 15, 2015
Project: Forest Lakes Filing 2
Location: Pond A (Filing 2B)

8. Initial Surcharge Volume

A) Depth of Initial Surcharge Volume (Minimum recommended depth is 4 inches)

D_{IS} = 4.0 in

B) Minimum Initial Surcharge Volume (Minimum volume of 0.3% of the WQCV)

V_{IS} = 54.2 cu ft

C) Initial Surcharge Provided Above Micropool

V_s = 177.0 cu ft

9. Trash Rack

A) Type of Water Quality Orifice Used

Choose One
- (•) Circular (up to 1-1/4" diameter)
- ( ) Circular (greater than 1-1/4" diameter) OR Rectangular (2" high)

B) Water Quality Screen Open Area: $A_t = Aot * 38.5*(e^{-0.095D})$

A_t = 463 square inches

C) For 1-1/4"", or Smaller, Circular Opening (See Fact Sheet T-12):

i) Width of Water Quality Screen and Concrete Opening ($W_{opening}$)

$W_{opening}$ = 12.0 inches

ii) Height of Water Quality Screen (H_{TR})

H_{TR} = 104.2 inches

iii) Type of Screen, Describe if "Other"

Choose One
- (•) S.S. Well Screen with 60% Open Area*
- ( ) Other (Describe):

Choose One
- ( ) Aluminum Amico-Klemp SR Series (or equal)
- ( ) Other (Describe):

inches

Design Procedure Form: Extended Detention Basin (EDB)

Designer: Matt Larson
Company: Classic Consulting
Date: December 15, 2015
Project: Forest Lakes Filing 2
Location: Pond A (Filing 2B)

10. Overflow Embankment A) Describe embankment protection for 100-year and greater overtopping:	Buried riprap spillway into adjacent lake
B) Slope of Overflow Embankment (Horizontal distance per unit vertical, 4:1 or flatter preferred)	Z_E = 3.00 ft / ft DIFFICULT TO MAINTAIN, INCREASE WHERE POSSIBLE
11. Vegetation	Choose One ○ Irrigated ◉ Not Irrigated
12. Access A) Describe Sediment Removal Procedures	

Notes:

Forest Lakes Filing 2B - Pond A

Project Summary	
Title	Forest Lakes Filing 2B - Pond A
Engineer	M. Larson
Company	Classic Consulting
Date	12/10/2015

Notes

Table of Contents

Forest Lakes Filing 2B - Pond A

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
Forest Lakes 2B	Post-Development 5 year	5	1.203	0.300	43.90
Forest Lakes 2B	Post-Development 100 year	100	2.256	0.300	74.60

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
O-1	Post-Development 5 year	5	0.940	0.600	0.70
O-1	Post-Development 100 year	100	1.874	0.500	36.07

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
POND (IN)	Post-Development 5 year	5	1.203	0.300	43.90	(N/A)	(N/A)
POND (OUT)	Post-Development 5 year	5	0.940	0.600	0.70	6,857.17	1.182
POND (IN)	Post-Development 100 year	100	2.256	0.300	74.60	(N/A)	(N/A)
POND (OUT)	Post-Development 100 year	100	1.874	0.500	36.07	6,858.82	1.783

Forest Lakes Filing 2B - Pond A

Subsection: Outlet Input Data

Return Event: 100 years

Label: Composite Outlet Structure - 1

Storm Event: C/S - Type IIA - Rational - 100 Year

Requested Pond Water Surface Elevations	
Minimum (Headwater)	6,851.50 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	6,859.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Inlet Box	Riser - 1	Forward	Culvert - 1	6,857.85	6,859.00
Orifice-Area	Orifice - 1	Forward	Culvert - 1	6,851.50	6,859.00
Culvert-Circular	Culvert - 1	Forward	TW	6,851.00	6,859.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Forest Lakes Filing 2B - Pond A

Subsection: Outlet Input Data

Return Event: 100 years

Label: Composite Outlet Structure - 1

Storm Event: C/S - Type IIA - Rational - 100 Year

Structure ID: Riser - 1 Structure Type: Inlet Box	
Number of Openings	1
Elevation	6,857.85 ft
Orifice Area	31.20000 ft²
Orifice Coefficient	0.600
Weir Length	12.00 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

Forest Lakes Filing 2B - Pond A

Subsection: Outlet Input Data

Return Event: 100 years

Label: Composite Outlet Structure - 1

Storm Event: C/S - Type IIA - Rational - 100 Year

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	30.0 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	0.009
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)	1.090
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	6,853.73 ft	T1 Flow	27.16 ft^3/s
T2 Elevation	6,853.98 ft	T2 Flow	31.05 ft^3/s

Forest Lakes Filing 2B - Pond A

Subsection: Outlet Input Data

Return Event: 100 years

Label: Composite Outlet Structure - 1

Storm Event: C/S - Type IIA - Rational - 100 Year

Structure ID: Orifice - 1 Structure Type: Orifice-Area	
Number of Openings	19
Elevation	6,851.50 ft
Orifice Area	0.00340 ft²
Top Elevation	6,857.85 ft
Datum Elevation	6,851.50 ft
Orifice Coefficient	0.600

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 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Forest Lakes Filing 2B - Pond A

Subsection: Level Pool Pond Routing Summary

Label: POND (IN)

Return Event: 5 years

Storm Event: C/S - Type IIA - Rational - 5 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	6,851.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	43.90 ft³/s	Time to Peak (Flow, In)	0.300 hours
Flow (Peak Outlet)	0.70 ft³/s	Time to Peak (Flow, Outlet)	0.600 hours

Elevation (Water Surface, Peak)	6,857.17 ft
Volume (Peak)	1.182 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	1.203 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.940 ac-ft
Volume (Retained)	0.259 ac-ft
Volume (Unrouted)	-0.004 ac-ft
Error (Mass Balance)	0.3 %

Forest Lakes Filing 2B - Pond A

Subsection: Level Pool Pond Routing Summary

Label: POND (IN)

Return Event: 100 years

Storm Event: C/S - Type IIA - Rational - 100 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	6,851.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	74.60 ft³/s	Time to Peak (Flow, In)	0.300 hours
Flow (Peak Outlet)	36.07 ft³/s	Time to Peak (Flow, Outlet)	0.500 hours

Elevation (Water Surface, Peak)	6,858.82 ft
Volume (Peak)	1.783 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	2.256 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	1.874 ac-ft
Volume (Retained)	0.379 ac-ft
Volume (Unrouted)	-0.002 ac-ft
Error (Mass Balance)	0.1 %

Forest Lakes Filing 2B - Pond A

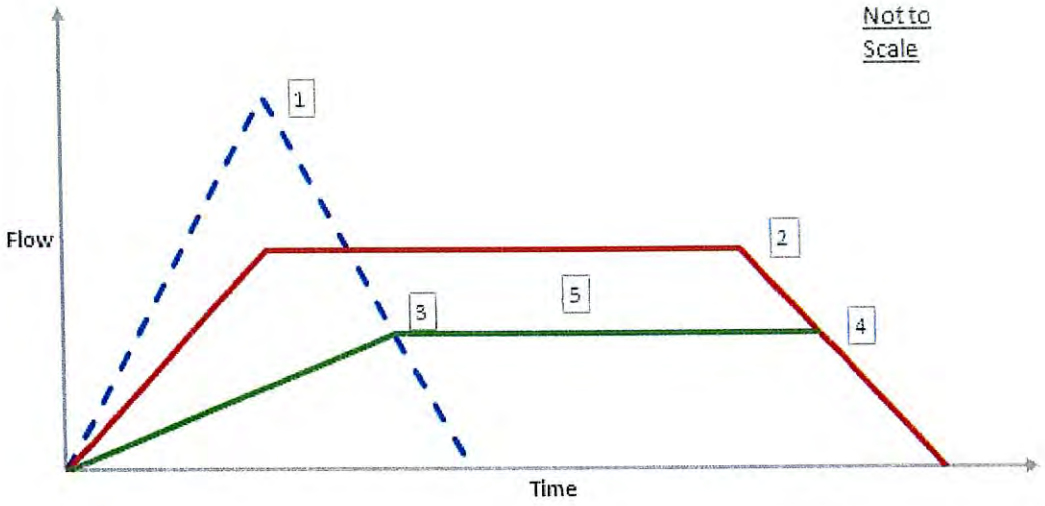
Subsection: Modified Rational Graph

Label: Forest Lakes 2B

Return Event: 5 years

Storm Event: C/S - Type IIA - Rational - 5 Year

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



[1]			[2]		
Time of Concentration (Modified Rational, Composite)	0.263	hours	Time of Duration (Modified Rational, Critical)	0.333	hours
Intensity (Modified Rational, Peak)	3.392	in/h	Intensity (Modified Rational, Critical)	3.014	in/h
Flow (Modified Rational, Peak)	49.41	ft³/s	Flow (Modified Rational, Critical)	43.90	ft³/s

[3]	
First Outflow Breakpoint (Modified Rational, Method T)	0.345 hours
Flow (Modified Rational, Allowable)	42.00 ft³/s

[4]			[5]		
Second Outflow Breakpoint (Modified Rational)	0.302	hours	Storage (Modified Rational, Estimated)	0.101	ac-ft
Flow (Modified Rational, Allowable)	42.00	ft³/s			

Forest Lakes Filing 2B - Pond A

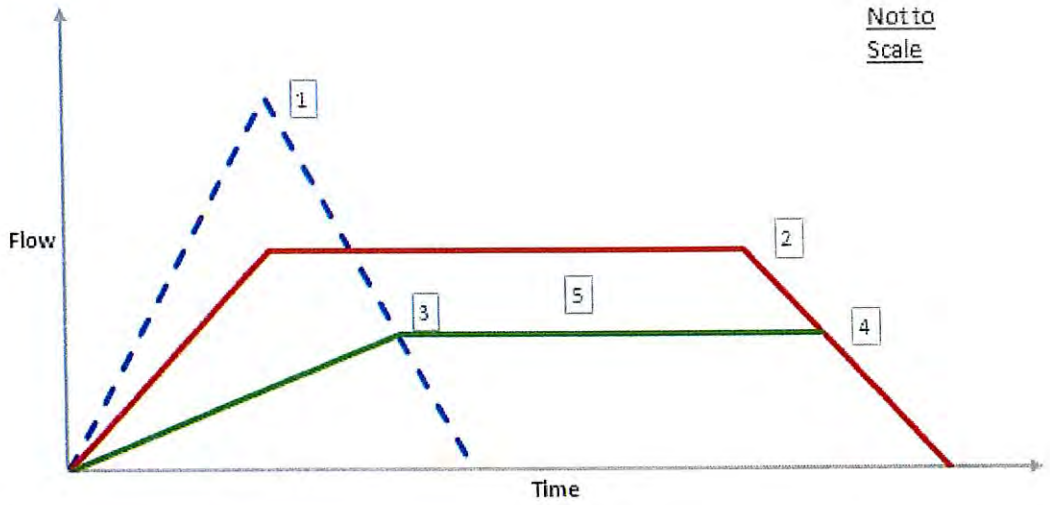
Subsection: Modified Rational Graph

Label: Forest Lakes 2B

Return Event: 100 years

Storm Event: C/S - Type IIA - Rational - 100 Year

Method Type	Method T
Time of Duration (Modified Rational, Critical)	0.367 hours



[1]			[2]		
Time of Concentration (Modified Rational, Composite)	0.263	hours	Time of Duration (Modified Rational, Critical)	0.367	hours
Intensity (Modified Rational, Peak)	6.031	in/h	Intensity (Modified Rational, Critical)	5.122	in/h
Flow (Modified Rational, Peak)	87.84	ft³/s	Flow (Modified Rational, Critical)	74.60	ft³/s

[3]	
First Outflow Breakpoint (Modified Rational, Method T)	0.482 hours
Flow (Modified Rational, Allowable)	42.00 ft³/s

[4]			[5]		
Second Outflow Breakpoint (Modified Rational)	0.400	hours	Storage (Modified Rational, Estimated)	1.027	ac-ft
Flow (Modified Rational, Allowable)	42.00	ft³/s			

Forest Lakes Filing 2B - Pond A

Index

Subsection: Elevation-Volume-Flow Table (Pond)

Label: POND

Return Event: 100 years

Storm Event: C/S - Type IIA - Rational - 100 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	6,851.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Elevation (ft)	Outflow (ft³/s)	Storage (ac-ft)	Area (acres)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
6,851.50	0.00	0.000	0.011	0.00	0.00	0.00
6,852.00	0.06	0.019	0.074	0.00	0.06	9.22
6,852.50	0.12	0.063	0.104	0.00	0.12	30.74
6,853.00	0.17	0.124	0.140	0.00	0.17	60.20
6,853.50	0.23	0.204	0.180	0.00	0.23	98.87
6,854.00	0.29	0.305	0.226	0.00	0.29	147.98
6,854.50	0.35	0.422	0.241	0.00	0.35	204.57
6,855.00	0.41	0.546	0.257	0.00	0.41	264.91
6,855.50	0.48	0.679	0.273	0.00	0.48	329.12
6,856.00	0.54	0.820	0.290	0.00	0.54	397.32
6,856.50	0.60	0.969	0.307	0.00	0.60	469.66
6,857.00	0.66	1.127	0.325	0.00	0.66	546.28
6,857.50	0.72	1.295	0.344	0.00	0.72	627.30
6,857.85	0.76	1.417	0.357	0.00	0.76	686.69
6,858.00	2.84	1.471	0.362	0.00	2.84	714.87
6,858.50	19.53	1.657	0.382	0.00	19.53	821.54
6,859.00	44.92	1.853	0.402	0.00	44.92	941.75
6,859.50	69.67	2.059	0.424	0.00	69.67	1,066.46
6,860.00	72.34	2.277	0.447	0.00	72.34	1,174.53

Stormwater Detention and Infiltration Design Data Sheet

Stormwater Facility Name: Detention/Storm Water Quality Facility 'A'

Facility Location & Jurisdiction: Forest Lakes Filing 2B - Forest Lakes Metropolitan District (El Paso County, CO)

User Input: Watershed Characteristics

Watershed Slope =	0.024	ft/ft
Watershed Length =	850	ft
Watershed Area =	22.82	acres
Watershed Imperviousness =	55.9%	percent
Percentage Hydrologic Soil Group A =		percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Groups C/D =		percent

Location for 1-hr Rainfall Depths (use dropdown): User Input

WQCV Treatment Method = Extended Detention

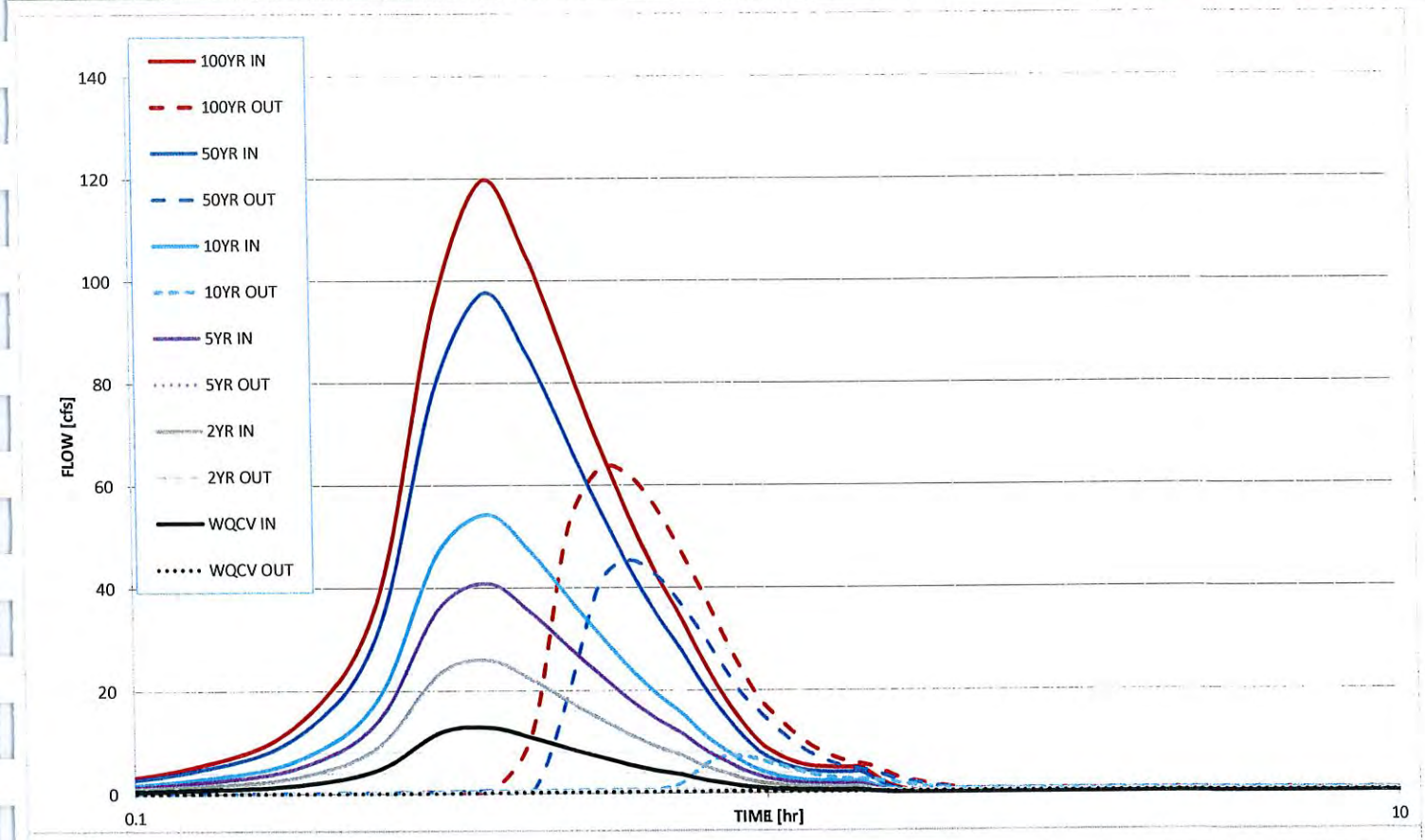
User Defined Stage [ft]	User Defined Area [ft^2]	User Defined Stage [ft]	User Defined Discharge [cfs]
0.00	500	0.00	0.00
0.50	3,245	0.50	0.06
2.50	9,842	1.00	0.12
4.50	12,645	1.50	0.17
6.50	15,788	2.00	0.23
7.50	17,532	2.50	0.29
8.50	19,470	3.00	0.35
		3.50	0.41
		4.00	0.48
		4.50	0.54
		5.00	0.60
		5.50	0.66
		6.00	0.72
		6.35	0.76
		6.50	2.84
		7.00	19.53
		7.50	44.92
		8.00	69.67
		8.50	72.34

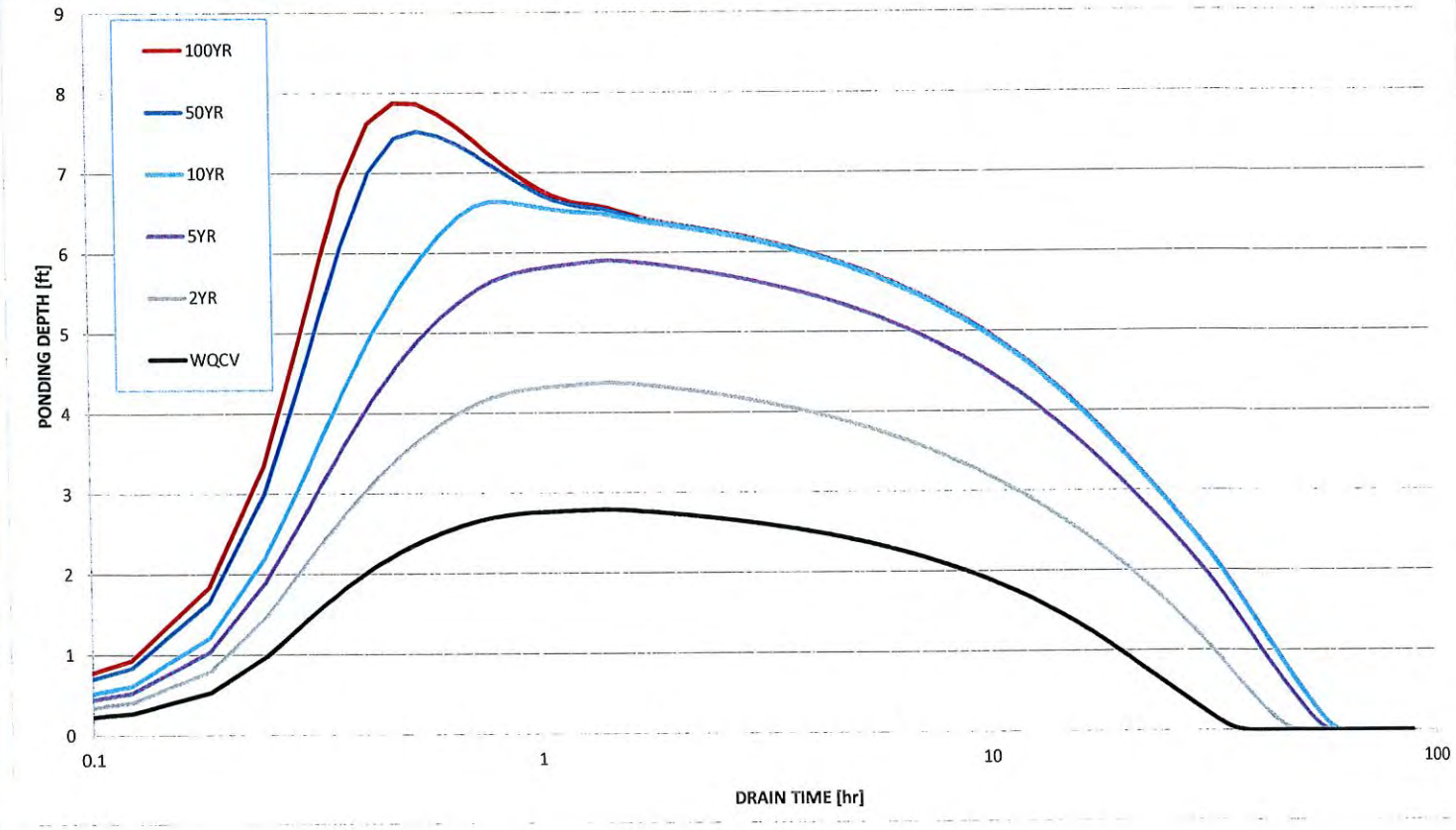
After completing and printing this worksheet to a pdf, go to:
https://maperture.digitaldataservices.com/gvh/?viewer=cswdif
create a new stormwater facility, and
attach the pdf of this worksheet to that record.

Routed Hydrograph Results

Design Storm Return Period =	WQCV	2 Year	5 Year	10 Year	50 Year	100 Year	
One-Hour Rainfall Depth =	0.71	0.88	1.18	1.44	2.15	2.49	in
Calculated Runoff Volume =	0.420	0.853	1.348	1.793	3.208	3.923	acre-ft
OPTIONAL Override Runoff Volume =							acre-ft
Inflow Hydrograph Volume =	0.420	0.852	1.347	1.793	3.207	3.922	acre-ft
Time to Drain 97% of Inflow Volume =	28.1	37.2	44.2	45.5	41.4	39.8	hours
Time to Drain 99% of Inflow Volume =	31.2	41.3	49.2	51.1	48.5	47.5	hours
Maximum Ponding Depth =	2.79	4.37	5.89	6.64	7.51	7.87	ft
Maximum Ponded Area =	0.235	0.286	0.340	0.367	0.403	0.419	acres
Maximum Volume Stored =	0.387	0.801	1.276	1.537	1.878	2.021	acre-ft

Stormwater Detention and Infiltration Design Data Sheet





DETENTION POND "B"

CLASSIC SM
CONSULTING
ENGINEERS & SURVEYORS

JOB NAME: FOREST LAKES FILING 2
JOB NUMBER: 1175.02
DATE: 12/16/15
CALCULATED BY: MAL

POND B TO SPILLWAY

POND SIZING WITH PONDPACK EQUATION:
INSERT POND DESIGN SIZE INFO: (RED)

POND ELEVATION : (from lowest to highest)
6828.00
6828.00
6829.00
6830.00
6832.00
6833.00

AREA (BTM to TOP):		
	-	acres
225	0.005	acres
3,579	0.082	acres
14,972	0.344	acres
24,711	0.567	acres
26,635	0.611	acres
	-	acres
	-	acres
	-	acres
	-	acres
	-	acres
	-	acres

PRELIMINARY SIZE:

VOLUME = 1/3{(EL2-EL1)*(A1+A2+((A1*A2)^.5))}

						CUMMULATIVE VOLUME:
-	AC-FT	from	6,828	to	6,828	
0.04	AC-FT	from	6,828	to	6,829	0.04
0.20	AC-FT	from	6,829	to	6,830	0.23
0.89	AC-FT	from	6,830	to	6,832	1.12
0.58	AC-FT	from	6,832	to	6,833	1.71
-	AC-FT	from	6,833	to	-	1.71
-	AC-FT	from	-	to	-	1.71
-	AC-FT	from	-	to	-	1.71
-	AC-FT	from	-	to	-	1.71
-	AC-FT	from	-	to	-	1.71
-	AC-FT	from	-	to	-	1.71

*SIZING IS FOR PRELIMINARY PURPOSES ONLY.

VOLUME = 1.71 AC-FT

APPROXIMATE SURFACE AREA REQUIREMENT

POND DEPTH (FT)	POND VOLUME AC-FT		CF	SURFACE AREA (SF)
4	1.71	=	74,385	18,596
6	1.71	=	74,385	12,397
8	1.71	=	74,385	9,298
10	1.71	=	74,385	7,438

JOB NAME: FOREST LAKES FILING 2
JOB NUMBER: 1175.02
DATE: 12/16/15
CALCULATED BY: MAL

POND B EURV (TOP OF BOX)

POND SIZING WITH PONDPACK EQUATION:
INSERT POND DESIGN SIZE INFO: (RED)

POND ELEVATION : (from lowest to highest)
6828.00
6828.00
6829.00
6830.00
6832.00
6832.10

AREA (BTM to TOP):	
-	acres
225	0.005 acres
3,579	0.082 acres
14,972	0.344 acres
24,711	0.567 acres
24,900	0.572 acres
-	acres
-	acres
-	acres
-	acres
-	acres
-	acres

PRELIMINARY SIZE:

VOLUME = 1/3{(EL2-EL1)*(A1+A2+((A1*A2)^.5))}

						CUMMULATIVE VOLUME:
-	AC-FT	from	6,828	to	6,828	
0.04	AC-FT	from	6,828	to	6,829	0.04
0.20	AC-FT	from	6,829	to	6,830	0.23
0.89	AC-FT	from	6,830	to	6,832	1.12
0.06	AC-FT	from	6,832	to	6,832	1.18
-	AC-FT	from	6,832	to	-	1.18
-	AC-FT	from	-	to	-	1.18
-	AC-FT	from	-	to	-	1.18
-	AC-FT	from	-	to	-	1.18
-	AC-FT	from	-	to	-	1.18
-	AC-FT	from	-	to	-	1.18

*SIZING IS FOR PRELIMINARY PURPOSES ONLY.

VOLUME = 1.18 AC-FT

APPROXIMATE SURFACE AREA REQUIREMENT

POND DEPTH (FT)	POND VOLUME AC-FT		CF	SURFACE AREA (SF)
4	1.18	=	51,430	12,858
6	1.18	=	51,430	8,572
8	1.18	=	51,430	6,429
10	1.18	=	51,430	5,143

JOB NAME: FOREST LAKES FILING 2
JOB NUMBER: 1175.02
DATE: 12/16/15
CALCULATED BY: MAL

POND B FOREBAY

POND SIZING WITH PONDPACK EQUATION:
INSERT POND DESIGN SIZE INFO: (RED)

POND ELEVATION : (from lowest to highest)
6829.20
6829.20
6830.00
6830.70

AREA (BTM to TOP):		
	-	acres
435	0.010	acres
553	0.013	acres
667	0.015	acres
	-	acres
	-	acres
	-	acres
	-	acres
	-	acres
	-	acres
	-	acres
	-	acres

PRELIMINARY SIZE:

VOLUME = 1/3{(EL2-EL1)*(A1+A2+((A1*A2)^.5))}

							CUMMULATIVE VOLUME:
-	AC-FT	from	6,829	to	6,829		
0.01	AC-FT	from	6,829	to	6,830		0.01
0.01	AC-FT	from	6,830	to	6,831		0.02
-	AC-FT	from	6,831	to	-		0.02
-	AC-FT	from	-	to	-		0.02
-	AC-FT	from	-	to	-		0.02
-	AC-FT	from	-	to	-		0.02
-	AC-FT	from	-	to	-		0.02
-	AC-FT	from	-	to	-		0.02
-	AC-FT	from	-	to	-		0.02
-	AC-FT	from	-	to	-		0.02

*SIZING IS FOR PRELIMINARY PURPOSES ONLY.

VOLUME = 0.019 AC-FT

APPROXIMATE SURFACE AREA REQUIREMENT

POND DEPTH (FT)	POND VOLUME AC-FT		CF	SURFACE AREA (SF)
4	0.02	=	812	203
6	0.02	=	812	135
8	0.02	=	812	102
10	0.02	=	812	81

Design Procedure Form: Extended Detention Basin (EDB)

Designer:	Matt Larson
Company:	Classic Consulting
Date:	December 16, 2015
Project:	Forest Lakes Filing 2
Location:	Pond B (Filing 2A)

1. Basin Storage Volume	
A) Effective Imperviousness of Tributary Area, I_a	I_a = 60.6 %
B) Tributary Area's Imperviousness Ratio (i = I_a / 100)	i = 0.606
C) Contributing Watershed Area	Area = 16.820 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}= 0.401 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))	$V_{DESIGN\ OTHER}$= 0.391 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 = 1.130 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 = 3.00 ft / ft DIFFICULT TO MAINTAIN, INCREASE WHERE POSSIBLE
4. Inlet	
A) Describe means of providing energy dissipation at concentrated inflow locations:	

Design Procedure Form: Extended Detention Basin (EDB)

Designer:	Matt Larson
Company:	Classic Consulting
Date:	December 16, 2015
Project:	Forest Lakes Filing 2
Location:	Pond B (Filing 2A)

5. Forebay	
A) Minimum Forebay Volume (V_{FMIN} = 3% of the WQCV)	V_{FMIN} = 0.010 ac-ft
B) Actual Forebay Volume	V_F = 0.019 ac-ft
C) Forebay Depth (D_F = 18 inch maximum)	D_F = 18.0 in
D) Forebay Discharge	
i) Undetained 100-year Peak Discharge	Q_{100} = 66.70 cfs
ii) Forebay Discharge Design Flow ($Q_F = 0.02 * Q_{100}$)	Q_F = 1.33 cfs
E) Forebay Discharge Design	Choose One: ○Berm With Pipe ◉Wall with Rect. Notch ○Wall with V-Notch Weir (flow too small for berm w/ pipe)
G) Rectangular Notch Width	Calculated W_N = 6.2 in
6. Trickle Channel	
A) Type of Trickle Channel	Choose One: ◉Concrete ○Soft Bottom
F) Slope of Trickle Channel	S = 0.0075 ft / ft
7. Micropool and Outlet Structure	
A) Depth of Micropool (2.5-feet minimum)	D_M = 2.5 ft
B) Surface Area of Micropool (10 ft^2 minimum)	A_M = 223 sq ft
C) Outlet Type	Choose One: ◉Orifice Plate ○Other (Describe):
D) Depth of Design Volume (EURV or 1.2 WQCV) Based on the Design Concept Chosen Under 1.E.	H = 4.50 feet
E) Volume to Drain Over Prescribed Time	EURV = 1.130 ac-ft
F) Drain Time (Min T_D for WQCV= 40 hours; Max T_D for EURV= 72 hours)	T_D = 72 hours
G) Recommended Maximum Outlet Area per Row, (A_o)	A_o = 0.85 square inches
H) Orifice Dimensions: i) Circular Orifice Diameter or	$D_{orifice}$ = 1 inches
I) Number of Columns	n_c = 1 number
J) Actual Design Outlet Area per Row (A_o)	A_o = 0.79 square inches
K) Number of Rows (nr)	n_r = 13 number
L) Total Outlet Area (A_{ot})	A_{ot} = 10.6 square inches
M) Depth of WQCV (H_{WQCV}) (Estimate using actual stage-area-volume relationship and V_{WQCV})	H_{WQCV} = feet
N) Ensure Minimum 40 Hour Drain Time for WQCV	$T_{D\,WQCV}$ = hours

Design Procedure Form: Extended Detention Basin (EDB)

Designer: Matt Larson
Company: Classic Consulting
Date: December 16, 2015
Project: Forest Lakes Filing 2
Location: Pond B (Filing 2A)

8. Initial Surcharge Volume	
A) Depth of Initial Surcharge Volume (Minimum recommended depth is 4 inches)	D_{IS} = 4.0 in
B) Minimum Initial Surcharge Volume (Minimum volume of 0.3% of the WQCV)	V_{IS} = 42.6 cu ft
C) Initial Surcharge Provided Above Micropool	V_s = 74.3 cu ft
9. Trash Rack	Choose One: (●) Circular (up to 1-1/4" diameter) ( ) Circular (greater than 1-1/4" diameter) OR Rectangular (2" high)
A) Type of Water Quality Orifice Used	
B) Water Quality Screen Open Area: $A_t = Aot * 38.5*(e^{-0.095D})$	A_t = 371 square inches
C) For 1-1/4"", or Smaller, Circular Opening (See Fact Sheet T-12):	
i) Width of Water Quality Screen and Concrete Opening ($W_{opening}$)	$W_{opening}$ = 12.0 inches
ii) Height of Water Quality Screen (H_{TR})	H_{TR} = 82.0 inches
iii) Type of Screen, Describe if "Other"	Choose One: ( ) S.S. Well Screen with 60% Open Area* ( ) Other (Describe):
	Choose One: ( ) Aluminum Amico-Klemp SR Series (or equal) ( ) Other (Describe):
	inches

Design Procedure Form: Extended Detention Basin (EDB)

Designer:	Matt Larson
Company:	Classic Consulting
Date:	December 16, 2015
Project:	Forest Lakes Filing 2
Location:	Pond B (Filing 2A)

10. Overflow Embankment A) Describe embankment protection for 100-year and greater overtopping:	Buried riprap spillway into adjacent Metro District parcel
B) Slope of Overflow Embankment (Horizontal distance per unit vertical, 4:1 or flatter preferred)	Z_E = 3.00 ft / ft DIFFICULT TO MAINTAIN, INCREASE WHERE POSSIBLE
11. Vegetation	Choose One ○ Irrigated ◉ Not Irrigated
12. Access A) Describe Sediment Removal Procedures	

Notes:

Forest Lakes Filing 2A - Pond B

Project Summary	
Title	Forest Lakes Filing 2A - Pond B
Engineer	M. Larson
Company	Classic Consulting
Date	12/10/2015

Notes

Table of Contents

Forest Lakes Filing 2A - Pond B

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
Forest Lakes 2A	Post-Development 5 year	5	0.793	0.250	20.60
Forest Lakes 2A	Post-Development 100-yr	100	1.506	0.250	60.76

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
O-1	Post-Development 5 year	5	0.218	0.700	0.15
O-1	Post-Development 100-yr	100	1.274	0.500	5.92

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
POND (IN)	Post-Development 5 year	5	0.793	0.250	20.60	(N/A)	(N/A)
POND (OUT)	Post-Development 5 year	5	0.218	0.700	0.15	6,828.64	0.789
POND (IN)	Post-Development 100-yr	100	1.506	0.250	60.76	(N/A)	(N/A)
POND (OUT)	Post-Development 100-yr	100	1.274	0.500	5.92	6,832.51	1.435

Forest Lakes Filing 2A - Pond B

Subsection: Outlet Input Data

Return Event: 100 years

Label: Composite Outlet Structure - B

Storm Event: C/S - Type IIA - Rational - 100 Year

Requested Pond Water Surface Elevations	
Minimum (Headwater)	6,825.50 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	6,833.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Inlet Box	Riser - 1	Forward	Culvert - 1	6,832.10	6,833.00
Orifice-Area	Orifice - 1	Forward	Culvert - 1	6,827.60	6,833.00
Culvert-Circular	Culvert - 1	Forward	TW	6,827.50	6,833.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Forest Lakes Filing 2A - Pond B

Subsection: Outlet Input Data

Return Event: 100 years

Label: Composite Outlet Structure - B

Storm Event: C/S - Type IIA - Rational - 100 Year

Structure ID: Riser - 1 Structure Type: Inlet Box	
Number of Openings	1
Elevation	6,832.10 ft
Orifice Area	15.60000 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

Forest Lakes Filing 2A - Pond B

Subsection: Outlet Input Data

Return Event: 100 years

Label: Composite Outlet Structure - B

Storm Event: C/S - Type IIA - Rational - 100 Year

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	18.0 in
Length	65.00 ft
Length (Computed Barrel)	65.00 ft
Slope (Computed)	0.005 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.018
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)	1.093
T2 ratio (HW/D)	1.195
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	6,829.14 ft	T1 Flow	7.58 ft³/s
T2 Elevation	6,829.29 ft	T2 Flow	8.66 ft³/s

Forest Lakes Filing 2A - Pond B

Subsection: Outlet Input Data

Label: Composite Outlet Structure - B

Return Event: 100 years

Storm Event: C/S - Type IIA - Rational - 100 Year

Structure ID: Orifice - 1 Structure Type: Orifice-Area	
Number of Openings	13
Elevation	6,827.60 ft
Orifice Area	0.00545 ft²
Top Elevation	6,832.10 ft
Datum Elevation	6,827.60 ft
Orifice Coefficient	0.600

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 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Forest Lakes Filing 2A - Pond B

Subsection: Level Pool Pond Routing Summary

Label: POND (IN)

Return Event: 5 years

Storm Event: C/S - Type IIA - Rational - 5 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	6,825.50 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	20.60 ft³/s	Time to Peak (Flow, In)	0.250 hours
Flow (Peak Outlet)	0.15 ft³/s	Time to Peak (Flow, Outlet)	0.700 hours

Elevation (Water Surface, Peak)	6,828.64 ft
Volume (Peak)	0.789 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.793 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.218 ac-ft
Volume (Retained)	0.574 ac-ft
Volume (Unrouted)	-0.001 ac-ft
Error (Mass Balance)	0.2 %

Forest Lakes Filing 2A - Pond B

Subsection: Level Pool Pond Routing Summary

Label: POND (IN)

Return Event: 100 years

Storm Event: C/S - Type IIA - Rational - 100 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	6,827.60 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	60.76 ft³/s	Time to Peak (Flow, In)	0.250 hours
Flow (Peak Outlet)	5.92 ft³/s	Time to Peak (Flow, Outlet)	0.500 hours

Elevation (Water Surface, Peak)	6,832.51 ft
Volume (Peak)	1.435 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	1.506 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	1.274 ac-ft
Volume (Retained)	0.224 ac-ft
Volume (Unrouted)	-0.009 ac-ft
Error (Mass Balance)	0.6 %

Forest Lakes Filing 2A - Pond B

Subsection: Modified Rational Hydrograph
Return Event: 5 years
Label: Forest Lakes 2A
Storm Event: C/S - Type IIA - Rational - 5 Year

Modified Rational Method

Q = CiA * Unit Conversion; Where Conversion = 43560 / (12 * 3600)

Frequency (years)	C Coefficient	C Adjustment Factor	C Coefficient (Final)	Intensity (in/h)	Area (acres)	Flow (Peak) (ft³/s)
5	1.000	1.000	0.481	2.526	16.820	20.60

Peak Discharge	20.60 ft³/s
Time to Peak	0.350 hours
Hydrograph Volume	1.723 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.050	4.79	9.58	14.37	19.17	20.60
0.300	20.60	20.60	20.60	20.60	17.41
0.550	12.62	7.83	3.03	0.00	(N/A)

Forest Lakes Filing 2A - Pond B

Subsection: Modified Rational Hydrograph
Return Event: 100 years
Label: Forest Lakes 2A
Storm Event: C/S - Type IIA - Rational - 100 Year

Modified Rational Method

Q = CiA * Unit Conversion; Where Conversion = 43560 / (12 * 3600)

Frequency (years)	C Coefficient	C Adjustment Factor	C Coefficient (Final)	Intensity (in/h)	Area (acres)	Flow (Peak) (ft³/s)
100	1.000	1.000	0.631	5.677	16.820	60.76

Peak Discharge	60.76 ft³/s
Time to Peak	0.250 hours
Hydrograph Volume	2.808 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.050	14.13	28.26	42.39	56.52	60.76
0.300	60.76	46.63	32.50	18.37	4.24
8.150	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Forest Lakes Filing 2A - Pond B

Index

Subsection: Elevation-Volume-Flow Table (Pond)

Label: POND

Return Event: 100 years

Storm Event: C/S - Type IIA - Rational - 100 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	6,827.60 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Elevation (ft)	Outflow (ft³/s)	Storage (ac-ft)	Area (acres)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
6,827.60	0.00	0.000	0.003	0.00	0.00	0.00
6,828.10	0.07	0.002	0.009	0.00	0.07	1.16
6,828.60	0.15	0.013	0.040	0.00	0.15	6.64
6,829.10	0.22	0.046	0.100	0.00	0.22	22.69
6,829.60	0.30	0.124	0.218	0.00	0.30	60.30
6,830.10	0.38	0.270	0.354	0.00	0.38	131.16
6,830.60	0.46	0.460	0.405	0.00	0.46	222.99
6,831.10	0.53	0.676	0.460	0.00	0.53	327.65
6,831.60	0.61	0.920	0.518	0.00	0.61	445.97
6,832.10	0.70	1.194	0.571	0.00	0.70	578.59
6,832.60	7.00	1.485	0.593	0.00	7.00	725.79
6,833.10	18.22	1.787	0.615	0.00	18.22	883.25
6,833.60	20.38	2.100	0.636	0.00	20.38	1,036.79
6,834.00	21.19	2.358	0.653	0.00	21.19	1,162.38

Stormwater Detention and Infiltration Design Data Sheet

Stormwater Facility Name: Detention/Storm Water Quality Facility 'B'

Facility Location & Jurisdiction: Forest Lakes Filing 2A - Forest Lakes Metropolitan District (El Paso County, CO)

User Input: Watershed Characteristics

Watershed Slope =	0.037	ft/ft
Watershed Length =	1150	ft
Watershed Area =	16.82	acres
Watershed Imperviousness =	60.6%	percent
Percentage Hydrologic Soil Group A =		percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Groups C/D =		percent

Location for 1-hr Rainfall Depths (use dropdown): User Input

WQCV Treatment Method = Extended Detention

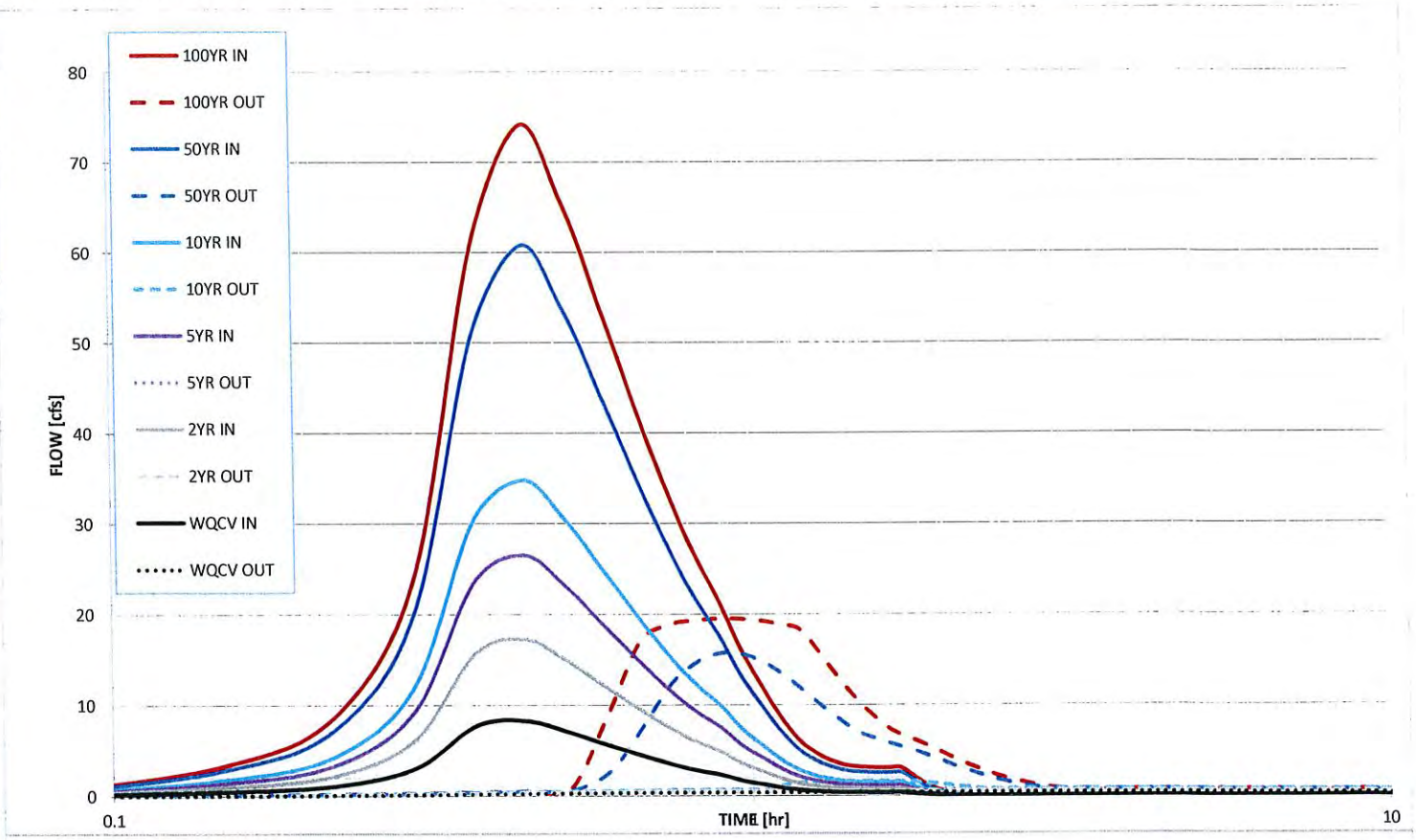
User Defined Stage [ft]	User Defined Area [ft^2]	User Defined Stage [ft]	User Defined Discharge [cfs]
0.00	131	0.00	0.00
0.40	225	0.50	0.07
1.40	3,579	1.00	0.15
2.40	14,972	1.50	0.22
4.40	24,711	2.00	0.30
5.40	26,635	2.50	0.38
6.40	28,441	3.00	0.46
		3.50	0.53
		4.00	0.61
		4.50	0.70
		5.00	7.00
		5.50	18.22
		6.00	20.38
		6.40	21.19

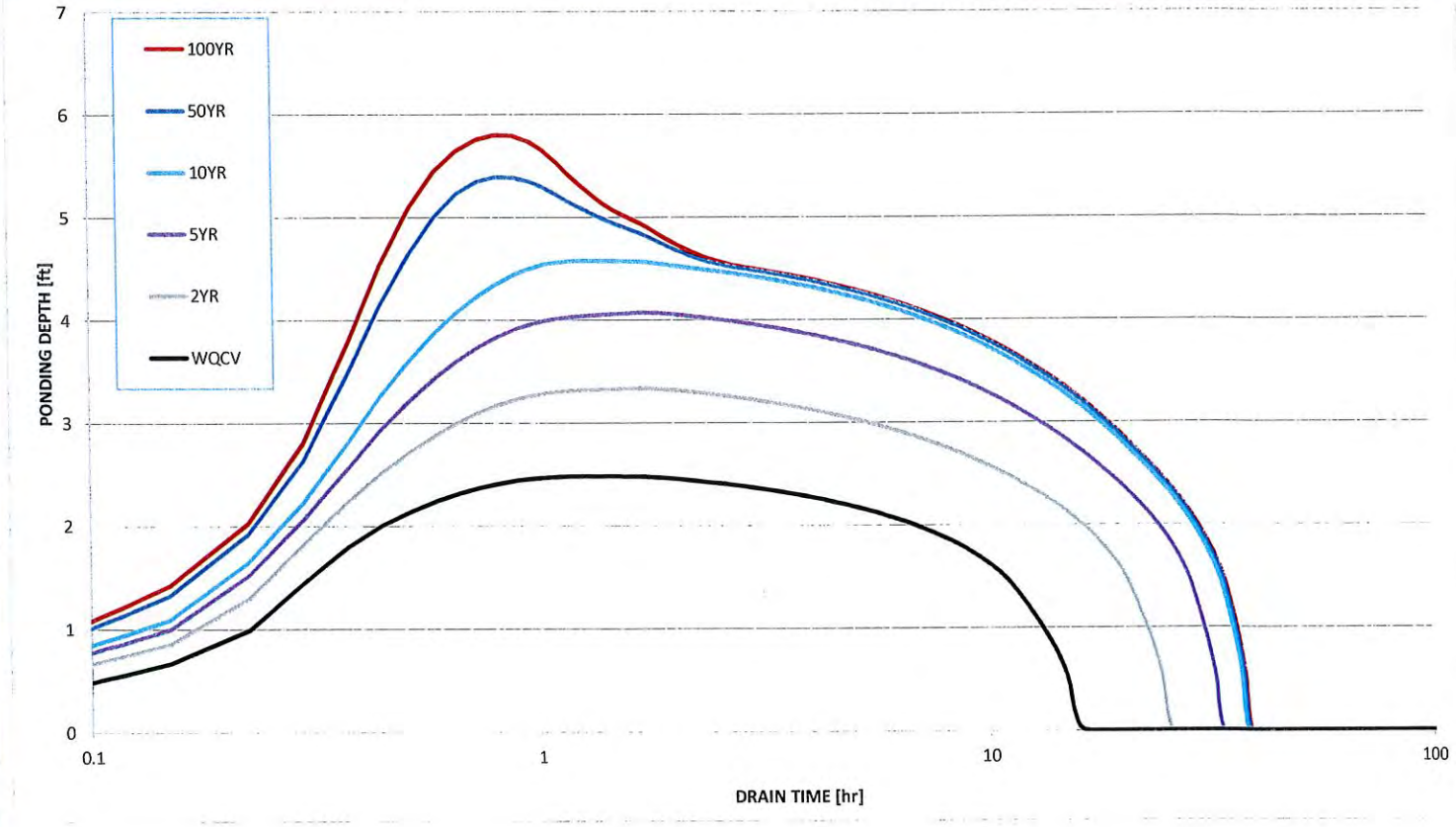
After completing and printing this worksheet to a pdf, go to:
https://maperture.digitaldataservices.com/gvh/?viewer=cswdif
create a new stormwater facility, and
attach the pdf of this worksheet to that record.

Routed Hydrograph Results

Design Storm Return Period =	WQCV	2 Year	5 Year	10 Year	50 Year	100 Year	
One-Hour Rainfall Depth =	0.71	0.88	1.18	1.44	2.15	2.49	in
Calculated Runoff Volume =	0.330	0.691	1.065	1.400	2.448	2.976	acre-ft
OPTIONAL Override Runoff Volume =							acre-ft
Inflow Hydrograph Volume =	0.330	0.690	1.064	1.400	2.447	2.975	acre-ft
Time to Drain 97% of Inflow Volume =	14.0	22.5	**29.5**	33.6	32.5	31.8	hours
Time to Drain 99% of Inflow Volume =	14.8	23.8	31.2	35.6	35.3	**35.1**	hours
Maximum Ponding Depth =	2.48	3.34	4.07	4.58	5.39	5.80	ft
Maximum Ponded Area =	0.352	0.448	0.530	0.575	0.611	**0.628**	acres
Maximum Volume Stored =	0.285	0.625	0.986	1.268	1.751	2.001	acre-ft

Stormwater Detention and Infiltration Design Data Sheet





DRAINAGE MAPS

CLASSIC SM
CONSULTING
ENGINEERS & SURVEYORS

BASIN RUNOFF SUMMARY		
BASIN	Q5 (CFS)	Q100 (CFS)
EX-A	3.5	8.4
EX-B	0.6	1.1
EX-C	3.3	9.3
EX-D	3.8	27.8
EX-E	3.5	25.4
EX-F	1.4	10.0
EX-H	2.8	20.6
EX-I	4.3	10.8
EX-J	3.7	7.8

DESIGN POINT SUMMARY			
DESIGN POINT	Q5 (CFS)	Q100 (CFS)	INLET SIZE
1	22.6	165.8	OFF-SITE RUNOFF
2	23.2	170.5	EX. TYPE D SUMP
3	3.5	8.4	EX. 5' SUMP
4	0.6	1.1	EX. 5' SUMP
5	3.3	9.3	EX. 15' AT-GRADE
6	29.8	192.4	SEDIMENT BASIN
7	30.7	199.0	PINON LAKE
8	3.8	27.8	BRISTLECONE LAKE
11	4.3	10.8	EX. 5' SUMP
12	3.7	7.8	EX. 5' SUMP

PIPE ROUTING		
PIPE/SIZE	Q5 (CFS)	Q100 (CFS)
1 ~ EX. 48"	23.2	170.5
2 ~ EX. 18"	3.5	8.4
3 ~ EX. 18"	3.9	9.1
4 ~ EX. 48"	24.8	174.2
5 ~ EX. 18"	3.2	6.8
6 ~ EX. 48"	25.9	176.5
14 ~ EX. 18"	4.3	10.8
15 ~ EX. 24"	7.9	18.3

N

100' 50' 0 100' 200'

SCALE: 1" = 100'

LEGEND

- EXISTING GROUND CONTOUR (5820)
- SITE BOUNDARY
- PROPOSED BASIN BOUNDARY
- PROP. DIRECTION OF DRAINAGE
- EXISTING STORM SEWER
- EXISTING STORM INLET
- BASIN IDENTIFIER / AREA IN ACRES (D / 1.41)
- PIPE RUN (1)
- DESIGN POINT (1)

OS-A 213.78 (1)
OS-B 6.09
EX-A 2.51
EX-I 2.58
EX-J 1.49
EX-B 0.16
EX-C 2.76
EX-D 13.53
EX-E 13.10
EX-BB 3.24
EX-CC 2.87
EX-F 6.10
EX-H 8.48

FOREST LAKES DRIVE
SITE BOUNDARY
BRISTLECONE LAKE
PINON LAKE

TRIBUTARY BASIN TO DP-29 PER "FINAL DRAINAGE REPORT FOR BAPTIST ROAD WEST," BY FELSBURG, HOLT & ULLEVIG & EPC STAFF DIRECTION

EXISTING 100-YR FEMA FLOODPLAIN PER JUNE 2004 LOMR

CLASSIC CONSULTING ENGINEERS & SURVEYORS SM
619 N. Cascade Avenue, Suite 200 (719)785-0790
Colorado Springs, Colorado 80903 (719)785-0799(Fax)

FOREST LAKES FILING NO. 2A & 2B

FINAL DRAINAGE REPORT
EXISTING CONDITIONS

DESIGNED BY	MAL	SCALE	DATE	12/14/15
DRAWN BY	MAL	(H) 1"= 100'	SHEET 1	OF 2
CHECKED BY		(V) 1"= N/A	JOB NO.	1175.02

N:\1175\02\DRAWINGS\DEVELOPMENT\1175D2-FDR-EXIST.dwg, 3/15/2016 11:17:48 PM, DWG To PDF.pc3

BASIN RUNOFF SUMMARY		
BASIN	Q5 (CFS)	Q100 (CFS)
EX-F	1.4	10.0
EX-G	3.2	23.8
EX-H	2.8	20.6
EX-AA	0.9	6.6
EX-BB	6.9	15.4
EX-CC	8.1	16.1

DESIGN POINT SUMMARY			
DESIGN POINT	Q5 (CFS)	Q100 (CFS)	INLET SIZE
7	30.7	199.0	PINON LAKE
8	3.9	30.1	BRISTLECONE LAKE
9	3.2	23.8	SURFACE
24	0.9	6.6	EX. TYPE D INLET
25	6.9	15.4	EX. 15' AT-GRADE
26	8.1	16.1	EX. 15' AT-GRADE
27	1.8	6.0	EX. 15' AT-GRADE
28	2.1	6.3	EX. 15' AT-GRADE
29	1.4	11.0	EX. TYPE D INLET

PIPE ROUTING		
PIPE/SIZE	Q5 (CFS)	Q100 (CFS)
7 ~ EX. 18"	0.9	6.6
8 ~ EX. 18"	5.1	14.2
9 ~ EX. 24"	10.0	22.3
10 ~ EX. 18"	1.8	4.5
11 ~ EX. 24"	13.1	29.8
12 ~ EX. 24"	1.4	11.0
13 ~ EX. 24"	11.8	34.7

THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE CAUSED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

NO.	REVISION	DATE

REVIEW:

PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF CLASSIC CONSULTING ENGINEERS AND SURVEYORS, LLC

KYLE R. CAMPBELL, COLORADO P.E. #29794 DATE

CLASSIC CONSULTING ENGINEERS & SURVEYORS
619 N. Cascade Avenue, Suite 200 (719)785-0790
Colorado Springs, Colorado 80903 (719)785-0799(Fax)

FOREST LAKES FILING NO. 2A & 2B

FINAL DRAINAGE REPORT
EXISTING CONDITIONS

DESIGNED BY	MAL	SCALE	DATE 12/14/15
DRAWN BY	MAL	(H) 1"= 100'	SHEET 2 OF 2
CHECKED BY		(V) 1"= N/A	JOB NO. 1175.02

BASIN RUNOFF SUMMARY		
BASIN	Q5 (CFS)	Q100 (CFS)
A	3.5	8.4
B	0.6	1.1
C	3.3	9.3
D	4.9	11.5
E	6.5	13.3
F	0.6	2.2
G	7.6	15.8
H	1.8	3.5
I	4.3	10.8
J	2.2	4.9
K	11.3	25.9
L	2.6	5.2
M	0.4	2.6
V	7.2	28.4
W	3.0	9.1
X	6.1	15.8
OS-A	22.6	165.8
OS-B	2.0	15.0

DESIGN POINT SUMMARY			
DESIGN POINT	Q5 (CFS)	Q100 (CFS)	INLET SIZE
1	22.6	165.8	OFF-SITE RUNOFF
2	23.2	170.5	EX. TYPE D SUMP
3	3.5	8.4	EX. 5' SUMP
4	0.6	1.1	EX. 5' SUMP
5	3.3	9.3	EX. 15' AT-GRADE
6	5.2	14.3	5' SUMP
7	6.5	13.3	5' SUMP
8	0.6	2.2	TYPE D GRATED
9	7.6	15.8	10' SUMP
10	1.8	3.5	5' SUMP
11	4.3	10.8	EX. 5' SUMP
12	2.2	4.9	EX. 5' SUMP
13	11.3	25.9	15' SUMP
14	2.6	5.2	5' SUMP
15	36.2	83.5	POND 'A'
16	28.5	196.7	PINON LAKE

PIPE ROUTING		
PIPE/SIZE	Q5 (CFS)	Q100 (CFS)
1 ~ EX. 48"	23.2	170.5
2 ~ EX. 18"	3.5	8.4
3 ~ EX. 18"	3.9	9.1
4 ~ EX. 48"	24.8	174.2
5 ~ EX. 18"	3.2	6.8
6 ~ EX. 48"	25.9	176.5
7 ~ 24"	6.5	13.3
8 ~ 30"	10.7	25.6
9 ~ 18"	0.6	2.2
10 ~ 30"	11.1	27.1
11 ~ 24"	7.6	15.8
12 ~ 18"	1.8	3.5
13 ~ 36"	18.8	42.5
14 ~ 18"	4.3	10.8
15 ~ 24"	6.5	15.5
16 ~ 30"	11.3	25.9
17a ~ 24"	2.6	5.2
17b ~ 30"	13.8	30.6
18 ~ 42"	36.0	81.7
19 ~ 30"	0.7	36.0

N

100' 50' 0 100' 200'

SCALE: 1" = 100'

LEGEND

EXISTING GROUND CONTOUR (5820)

PROPOSED FINISHED CONTOUR 5820

SITE BOUNDARY

PROPOSED BASIN BOUNDARY

PROP. DIRECTION OF DRAINAGE

EXISTING STORM SEWER

EXISTING STORM INLET

PROPOSED STORM SEWER

PROPOSED STORM INLET

BASIN IDENTIFIER → D

AREA IN ACRES → 1.41

PIPE RUN

DESIGN POINT

LOW POINT L.P.

HIGH POINT H.P.

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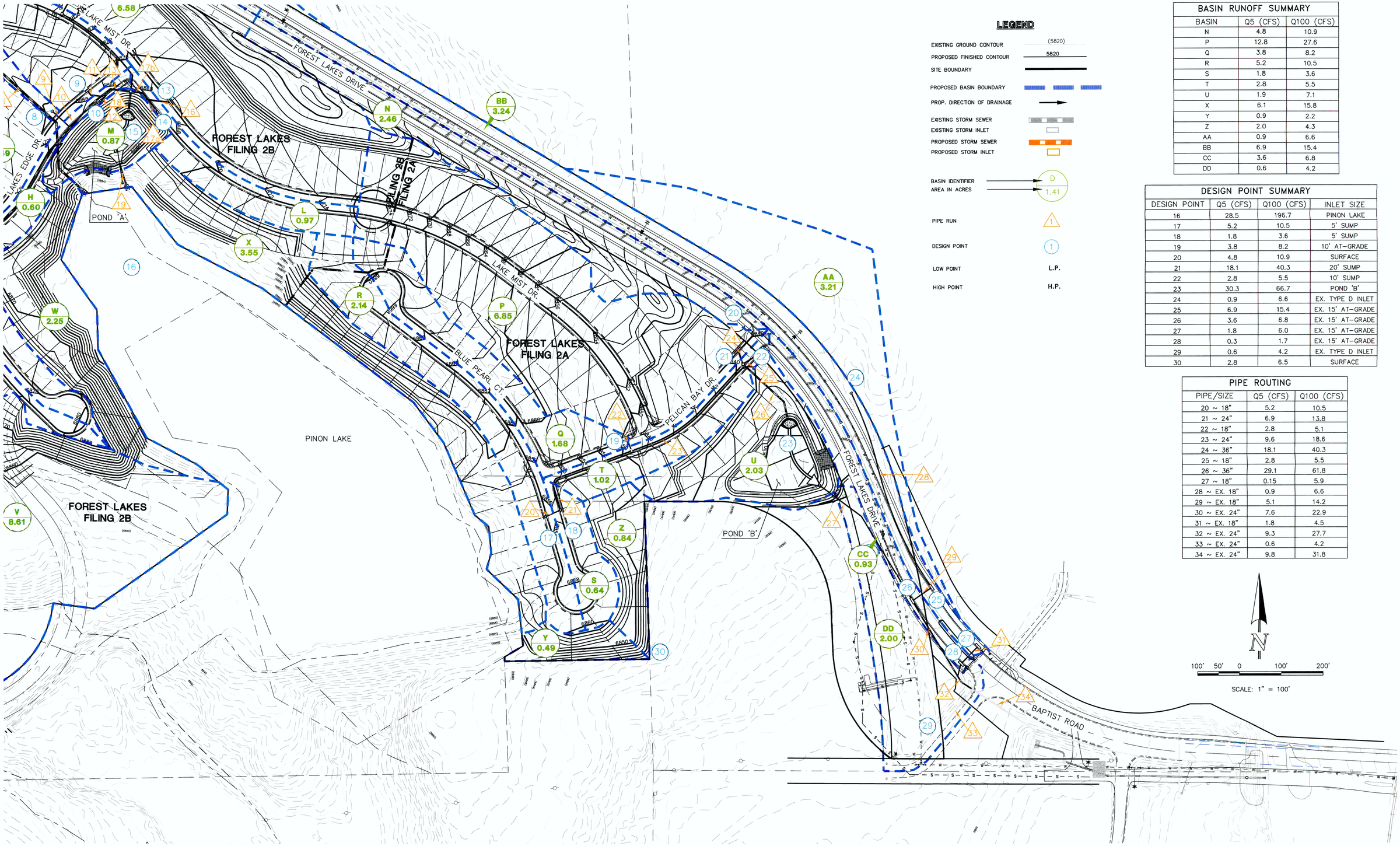
Colorado Springs, Colorado 80903
(719)785-0790
(719)785-0799(Fax)

FOREST LAKES FILING NO. 2A & 2B

FINAL DRAINAGE REPORT
DEVLOPED CONDITIONS

DESIGNED BY	MAL	SCALE	DATE 12/14/15
DRAWN BY	MAL	(H) 1"= 100'	SHEET 1 OF 2
CHECKED BY		(V) 1"= N/A	JOB NO. 1175.02



LEGEND

- EXISTING GROUND CONTOUR (5820)
- PROPOSED FINISHED CONTOUR 5820
- SITE BOUNDARY
- PROPOSED BASIN BOUNDARY
- PROP. DIRECTION OF DRAINAGE
- EXISTING STORM SEWER
- EXISTING STORM INLET
- PROPOSED STORM SEWER
- PROPOSED STORM INLET
- BASIN IDENTIFIER / AREA IN ACRES — D / 1.41
- PIPE RUN — 1
- DESIGN POINT — 1
- LOW POINT — L.P.
- HIGH POINT — H.P.

BASIN RUNOFF SUMMARY

BASIN	Q5 (CFS)	Q100 (CFS)
N	4.8	10.9
P	12.8	27.6
Q	3.8	8.2
R	5.2	10.5
S	1.8	3.6
T	2.8	5.5
U	1.9	7.1
X	6.1	15.8
Y	0.9	2.2
Z	2.0	4.3
AA	0.9	6.6
BB	6.9	15.4
CC	3.6	6.8
DD	0.6	4.2

DESIGN POINT SUMMARY

DESIGN POINT	Q5 (CFS)	Q100 (CFS)	INLET SIZE
16	28.5	196.7	PINON LAKE
17	5.2	10.5	5' SUMP
18	1.8	3.6	5' SUMP
19	3.8	8.2	10' AT-GRADE
20	4.8	10.9	SURFACE
21	18.1	40.3	20' SUMP
22	2.8	5.5	10' SUMP
23	30.3	66.7	POND 'B'
24	0.9	6.6	EX. TYPE D INLET
25	6.9	15.4	EX. 15' AT-GRADE
26	3.6	6.8	EX. 15' AT-GRADE
27	1.8	6.0	EX. 15' AT-GRADE
28	0.3	1.7	EX. 15' AT-GRADE
29	0.6	4.2	EX. TYPE D INLET
30	2.8	6.5	SURFACE

PIPE ROUTING

PIPE/SIZE	Q5 (CFS)	Q100 (CFS)
20 ~ 18"	5.2	10.5
21 ~ 24"	6.9	13.8
22 ~ 18"	2.8	5.1
23 ~ 24"	9.6	18.6
24 ~ 36"	18.1	40.3
25 ~ 18"	2.8	5.5
26 ~ 36"	29.1	61.8
27 ~ 18"	0.15	5.9
28 ~ EX. 18"	0.9	6.6
29 ~ EX. 18"	5.1	14.2
30 ~ EX. 24"	7.6	22.9
31 ~ EX. 18"	1.8	4.5
32 ~ EX. 24"	9.3	27.7
33 ~ EX. 24"	0.6	4.2
34 ~ EX. 24"	9.8	31.8

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FOREST LAKES FILING NO. 2A & 2B

FINAL DRAINAGE REPORT
DEVELOPED CONDITIONS

DESIGNED BY	MAL	SCALE		DATE	12/14/15
DRAWN BY	MAL	(H) 1"= 100'		SHEET	2 OF 2
CHECKED BY		(V) 1"= N/A		JOB NO.	1175.02