Town of Milliken
Stormwater Master Plan

September 2014

Town of Milliken, Colorado

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Town of Milliken
Mr. Milt Tokunaga
1101 Broad Street
Milliken, CO, 80543

RE: Town of Milliken Stormwater Master Plan

Dear Mr. Tokunaga:

ICON Engineering, Inc. is pleased to submit the Milliken Stormwater Master Plan. This submittal includes the hydrologic analysis that was originally submitted on July 14, 2014, in addition to hydraulic and alternatives analyses, including a recommended plan for stormwater conveyance in the Town of Milliken. Additional survey data provided by Lamp, Rynearson, & Associates in August has updated the hydrologic analyses. Flood hazards have been identified through the use of 2-dimensional modeling, showing significant risk to the eastern part of Town.

Stormwater Master Plans are commonly used by local and regional governments in a manner similar to land use, parks, or other master plans. These plans become part of the local community's comprehensive and capital improvement plans. Stormwater master plans help community leaders, planners, and engineers work with developers and private land owners. Stormwater drainage is unaffected by administrative or paper boundaries and a stormwater master plan helps all parties understand the natural conditions, constraints, and opportunities to manage stormwater in a safe, compliant, and sustainable manner. Like most master plans, this report provides the Town a starting point for ensuring the public safety and welfare of its citizens, businesses, and visitors.

The Town has an October 1982 "Flood Plain Information, Drainage Plan, and Street Improvement Plan" completed by Simons, Li, & Associates of Denver, Colorado in coordination with the Colorado Water Conservation Board. This report has served as the Stormwater Master Plan. However, the Town's growth and updates to engineering analysis means and methods supports an new study. This Stormwater Master Plan utilizes current topographic, property, and engineering data collected in 2013 and 2014. Like its predecessor, this report is likely to serve the community for many years to come.

Alternatives have been developed in order to mitigate flooding potential and increase safety and water quality in the Town. These alternatives include the provision of detention areas to mitigate changes in land use and hydrology, adding stormwater conveyance capacity to channels and pipes, and preservation of natural floodplain areas. Proposed detention and water quality has been provided at the Pheasant Hills sump, in addition to a new detention area upstream of Lola Park. New detention areas would minimize costs for 100-year conveyance through the Town.

In addition, additional stormwater conveyance is proposed at the intersection of Alice Avenue and the Union Pacific Railroad, in order to mitigate flood hazards in the area. Increased conveyance is also proposed west of Quentine Avenue to intercept floodwaters, routing them around, rather than through the Town. These alternatives will reduce flooding potential and flood hazards along Quentine and Alice Avenues.

It is worth noting that the conclusions of the 1982 Study are very similar to the conclusions discovered in the course of this stormwater master plan and associated Flood Recovery studies and grant applications. The 1982 recommendations were not implemented in full, so this study re-recommends many of those improvements to the drainage infrastructure.

This report is produced for the Town in a variety of formats. Hardcopy reports are provided to the Town as interim and final deliverables. Electronic PDF copies of the entire report and appendices are provided to the Town. And, the supporting map information is provided on a web-based mapping program that can be hosted on the Town's website now and in the future.

ICON would like to acknowledge the project team's assistance in the preparation of this study. This report could not have been prepared without input from the team members and Town staff. We believe this report will provide a solid framework for the future development of the Town of Milliken.

Sincerely,

ICON Engineering, Inc.

Terry Martin, P.E. CFM
Project Engineer

Troy Carmann, P.E. CFM
Project Manager

TABLE OF CONTENTS

Section 1.0 Introduction

1.1 Authorization..... 1
1.2 Purpose & Scope..... 1
1.3 Planning Process..... 1
1.4 Mapping & Surveys..... 2
1.5 Data Collection..... 2
1.6 Acknowledgements 2

Section 2.0 Study Area Description

2.1 Project Area..... 3
2.2 Land Use..... 5
2.3 Outfall & Tributary Description..... 5
2.4 Flood History..... 6

Section 3.0 Hydrologic Analysis

3.1 Overview..... 8
3.2 Design Rainfall..... 8
3.3 Subwatershed Characteristics.....8
3.4 Hydrograph Routing..... 8
3.5 Previous Studies and Results of Analysis.....9

Section 4.0 Hydraulic Analysis

4.1 Evaluation of Existing Facilities..... 11
4.2 Existing Drainage Facilities..... 11
4.3 Flood Hazards.....12
4.4 Previous Analysis..... 13

Section 5.0 Alternatives Analysis

5.1 Alternative Development Process..... 14
5.2 Alternative Hydrology & Hydraulics..... 14
5.3 Alternative Cost Estimates..... 15
5.4 Alternative Plans..... 17

Section 6.0 Recommended Plan

6.1 Plan Description..... 22
6.2 Water Quality Impacts..... 22
6.3 Operations & Maintenance..... 22
6.4 Environmental & Safety Assessment..... 22

Section 7.0 References..... 24

LIST OF TABLES

Table 1.1, Project Participants..... 2
Table 2.1, Land Use Values.....5
Table 3.1, 1-Hour Rainfall Depths.....8
Table 3.2, Comparison with Previous Studies..... 9
Table 3.3, Summary of Peak Flows.....10
Table 4.1, Existing Facilities Inventory..... 12
Table 5.1 Baseline Hydrology Minimum Required Detention.....14
Table 5.2, Baseline Peak Flow Comparison at Select Locations.....15
Table 5.3, Master Plan Unit Costs..... 16
Table 5.4, Lola Park Tributary Improvements, 100-Year Conveyance with Detention.....17
Table 5.5, Lola Park Tributary Improvements, 100-Year Conveyance without Detention....19
Table 5.6, Eastern Tributary Improvements, 100-Year Conveyance with Detention.....19
Table 5.7, Eastern Tributary Improvements, 100-Year Conveyance without Detention..... 20
Table 5.8, Northern Tributary Improvements, 100-Year Conveyance without Detention... 20
Table 5.9, Alternative Cost Summaries..... 21
Table 6.1, Recommended Plan Cost Summaries..... 23

LIST OF FIGURES

Figure 2.1, Vicinity Map.....3
Figure 2.2, Watershed Map..... 4
Figure 6.1, Recommended Plan Map..... 24

APPENDICES

Appendix A – Hydrologic Analysis
Appendix B – Hydraulic Analysis
Appendix C – Alternatives Analysis
Appendix D – Recommended Plan
Appendix E – Relevant Excerpts

SECTION 1.0 INTRODUCTION

1.1 Authorization

This report was authorized by the Town of Milliken under the April 2014 agreement regarding "Storm Drainage Master Plan, Utility Fee Assessment, and Storm Drainage Criteria Manual Update". Notice to proceed was provided by the Town of Milliken on April 16, 2014.

1.2 Purpose & Scope

ICON Engineering, Inc. has been placed under contract by the Town of Milliken to prepare an update to the Town's 1982 drainage Master Plan. The purpose of this report is to evaluate the watershed tributary to the Town, identify existing system deficiencies, and to develop an alternatives plan for mitigation of flood problems, stormwater conveyance, and water quality improvement. Methodology and calculations for this analysis focus on the 100-year storm event, although calculations for the 2-, 5-, 10-, 25-, 50-, and 500-year return periods were also developed.

The following is a summary of the scope of work completed for this study:

1. Coordination and meetings with the Town and project stakeholders;
2. Hydrologic Analysis –
    a. Obtain and review previously published hydrologic information within the Milliken watershed;
    b. Review and provide adjustments to land use parameters and subwatershed boundaries;
    c. Utilize CUHP v1.4.3 and EPA-SWMM v5.0.22 to complete the hydrologic analysis;
    d. Develop hydrologic discharges and hydrographs for the 2-,5-,10-,25-,50-,100-, and 500-year recurrence intervals for both existing and future development conditions;
3. Hydraulic Analysis –
    a. Evaluate the hydraulic capacity of existing channels, conduits, streets, and culverts;
    b. Evaluate impacts of residual flooding throughout the Town;
4. Alternatives Analysis –
    a. Creation of baseline hydrology;
    b. Development of project alternatives considering conveyance, detention, water quality, stream stabilization, and conduits;
    c. Development of alternative cost estimates;
    d. Recommend an alternative plan for conceptual design.

Hydrologic information presented in this report is based on current (existing) and projected (future) land use conditions. Prior to the use of this report for planning or design purposes, the user is advised to contact the Town to determine if the information presented in this report has been amended.

1.3 Planning Process

One hydrologic study has been previously developed for the Town of Milliken, as part of a report entitled "*Flood Plain Information, Drainage Plan and Street Improvement Plan at Milliken, Colorado"* (Reference 1), dated October 1982. Additionally, in 1979, the Federal Emergency Management Agency (FEMA) completed a Flood Insurance Study (FIS) for the Milliken area, however, this study focuses on the Little Thompson River, and not areas tributary to downtown Milliken.

Progress meetings were held to discuss project status and technical approach for the project. Philosophical goals for alternatives were discussed at periodic progress meetings.

Within the Town of Milliken, the goals for the project include:

1. The reduction of the threat to human life and property caused by localized flooding;
2. To provide a basis for the management of future development within the Town;
3. To determine the most economically feasible flood control alternative for local drainage problem areas;
4. Increasing detention to mitigate hydrologic changes due to land use;
5. Increased conveyance capacity at canal and railroad crossings;
6. Use of regional detention to minimize required conveyance

A kickoff meeting was held on May 8, 2014 to introduce project sponsors and understand the goals for this Master Plan. Subsequent meetings were held regularly to discuss hydrologic and hydraulic results, alternative plans, and to review comments.

This master plan, like its predecessor, is developed in close coordination with the greater flood recovery planning process. The flood event on September 12, 2013 triggered the immediate and long term responses to increasing risk awareness and resiliency. The Colorado Water Conservation Board (CWCB) has a full history of the 2013 flood event.

The Town's master plan process follows closely along with the local, regional, state, and federal recovery, planning, and mitigation processes to ensure a comprehensive and coordinated plan for the Town's resiliency to flooding and other related natural disasters. At the time of this report, there are still many technical and administrative details related to the flood recovery that are undetermined. For example, flood studies on the Big Thompson and Little Thompson Rivers have not published revised hydrologic estimates for the respective basins. Therefore, all flood recovery mapping and related work on these flood sources has used the effective FEMA hydrology. Notably, the flood recovery mapping provided by the Colorado Water Conservation Board, on the Little Thompson through the Town of Milliken is based on FEMA effective flows and fully blocked crossings. As additional details are provided, these studies may be revised. It is possible that the revised base flood event hydrology for the Little Thompson River could be approved by the CWCB in 2015. Other mitigation grants and programs also remain in progress.

There are a number of grants and programs that were coordinated with the development of this master plan. The Department of Labor and Affairs (DOLA), Hazard Mitigation Grant Program (HMGP), and Community Development

Block Grant – Disaster Recovery (CDBG-DR) were all programs the Town Staff and associated partners have spent considerable time through 2013 and 2014 to leverage the best possible outcome for the Town and its residents.

A unique and noteworthy point for this master plan is the coordinated public outreach between the State Flood Recovery mapping project, grant programs, and the master plan. Summarized by the Town's public meeting records, nearly every public meeting on any one of the aforementioned projects or plans related to the Town's master planning process. As drainage knows no administrative boundaries, stormwater master planning involves local, regional, state and federal efforts to ensure a coordinated approach.

As of the date of this report, the Floodplain Recovery Mapping is complete – the Town's adoption of the floodplain was recorded in March 2014. The Town submitted an HMGP application in August. The HMGP application is currently being reviewed by FEMA. The Town will be submitting for CDBR-DR funding for both rounds two and three.

1.4 Mapping & Surveys

LiDAR mapping, completed in January 2014, was obtained from the United States Geological Survey (USGS) for use on this project. The LiDAR dataset included 0.35-meter ground sampling distance, provided on NAVD 88 vertical datum and the NAD 83 horizontal datum. Supplemental ground survey was completed by Lamp, Rynearson & Associates in the summer of 2014. Additional mapping for existing utilities was provided by the Town of Milliken in CAD format.

1.5 Data Collection

Multiple drainage studies and as-built construction documents were collected from the Town of Milliken. The primary references used for this study are as follows:

- Town of Milliken Comprehensive Plan Framework Map, 2010
- Town of Milliken Zoning Map, from Town Website, circa 2012
- Town of Milliken Estimated Growth Areas, from Town Website, created circa 2011-2012
- Tetra Tech RMC, January 2004, *Final Drainage Report for Pheasant Hills*
- Rocky Mountain Consultants, (RMC), July 2000, *Final Drainage Report for Centennial Farms Subdivision*
- RMC, April 2000, *Supplemental Drainage Study for Centennial and Pheasant Hills Master Plan*
- RMC, August 2000, *Preliminary Drainage Report for Settlers Village of the Centennial Development*
- RMC, July 2000, *Final Drainage Report for the Colony Pointe Subdivision*
- Loonan & Associates, November 1999, Quentine Avenue Storm Sewer As-Built Drawings

1.6 Acknowledgements

This report was prepared with the cooperation of the Town of Milliken. The representatives who were involved with this study are listed in the following table:

Table 1.1 – Project Participants

Name	Representing	Title
Anne Johnson	Town of Milliken	Community and Economic Development Director
Seth Hyberger	Town of Milliken	Community Engagement Specialist/Planner
Omar Herrera	Lamp, Rynearson & Associates	Town of Milliken Engineer
Troy Spraker	Lamp, Rynearson & Associates	Town of Milliken Engineer
Troy Carmann, P.E.	ICON Engineering	Project Manager
Jeremy Deischer, E.I.	ICON Engineering	Project Engineer
Terry Martin, P.E.	ICON Engineering	Project Engineer

SECTION 2.0 STUDY AREA DESCRIPTION

2.1 Project Area

The watershed area studied for this Master Plan update is approximately 19.8 square miles in size, divided into five main flow paths, designated herein as the Western Tributary, the Lola Park Tributary, the Eastern Tributary, the Big Thompson Tributary, and the Northern Tributary. The Lola Park and Western tributaries discharge into the Little Thompson River, while the Northern, Eastern, and Big Thompson tributaries drain to the Big Thompson River.

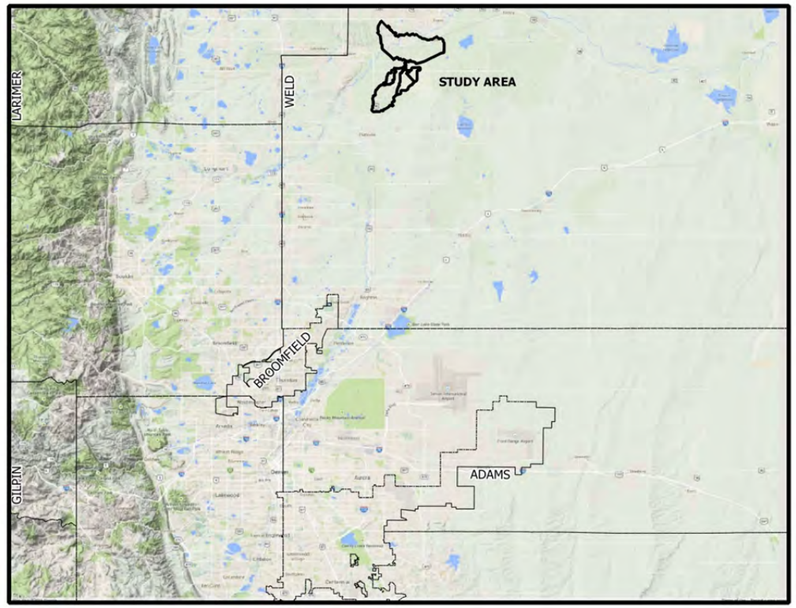


Figure 2.1 – Vicinity Map

The Western, Eastern, and Lola Park Tributaries are generally located south of downtown Milliken, extending nearly to the South Platte River. South of County Road 46 (County Road 46), these watersheds are, for the most part, undeveloped, although they are zoned for future development. The undeveloped areas consist mainly of farmland or open range, with several small single family developments. North of County Road 46, the development generally intensifies, with smaller-lot single family residential areas dominating, including some commercial areas in the downtown portion of Milliken. These tributaries vary in elevation from a high of approximately 4960', to a low of 4730'. The soil types are a mix of Hydrologic Soil Group B, C, and D, as defined by the National Resources Conservation Service (NRCS). The majority of the soils in the upper watershed areas are type C, with areas in the Town generally type B, and only a small fraction of type D soils. The average slope across these tributaries is very flat, at approximately 0.8%.

The Northern Tributary is located north of the Big Thompson River, and has been annexed by the Town since the publication of the 1982 stormwater master plan. As with the other tributaries, it consists mainly of open space rangeland, with some single family residential development centered around the Mad Russian Golf Course. The Northern Tributaries are generally long, thin watersheds, each discharging to a separate point along the Big Thompson River. Although some of these areas are outside of the Town limits, they were included in order to properly account for any future changes that may occur related to the Town's road right-of-way in that basin. The Northern Tributary includes several watersheds directly tributary to the Big Thompson River, downstream of the confluence with the Little Thompson River. These watersheds discharge across a portion of Town property which connects the future Homestead at Ashton subdivision to the Old Town area. The Northern Tributary ranges in elevation from a high of 5050' to a low of 4710' along the Big Thompson River. Soils are predominately type B, with a small amount of type C soil located in the higher portion of the watershed. The Northern Tributary is steeper than the other tributaries, with an average slope of approximately 2.2%.

The Big Thompson Tributary is located east of the Union Pacific Railroad (UPRR), south of the Big Thompson River. The Settler's Village development is located in the Big Thompson Tributary. It also contains isolated pockets of industrial development, as well as the Town water treatment plant. This tributary is relatively flat river bottom area, with elevations ranging from 4748' to 4718'. The soils are mostly type B, with a small amount of type D soil in the south. Average slopes across the Big Thompson Tributary are approximately 0.4%.

Runoff generated by the five tributaries is conveyed through both open and closed conduit systems, depending on location. In undeveloped areas, conveyance is almost exclusively via open channels and roadway crossings. Storm sewers and roadways (including borrow ditches) are used to convey stormwater runoff in developed areas.

A total of five existing formal detention facilities were considered in this report. They include Ehrlich Lake, the Settler's Village Pond at County Road 46 and CR25, Centennial Lake, located north of the Settler's Village Pond on State Highway 60, and the Centennial Farms Pond at the intersection of Alice Avenue and County Road 46. The Pheasant Hills Sump, located on CR21 at the Lola Park Tributary crossing, was also included in this study, despite its lack of a formal outlet structure. Alternatives for additional detention facilities, such as ponds on the downstream end of Lola Tributary, are discussed later in this report.

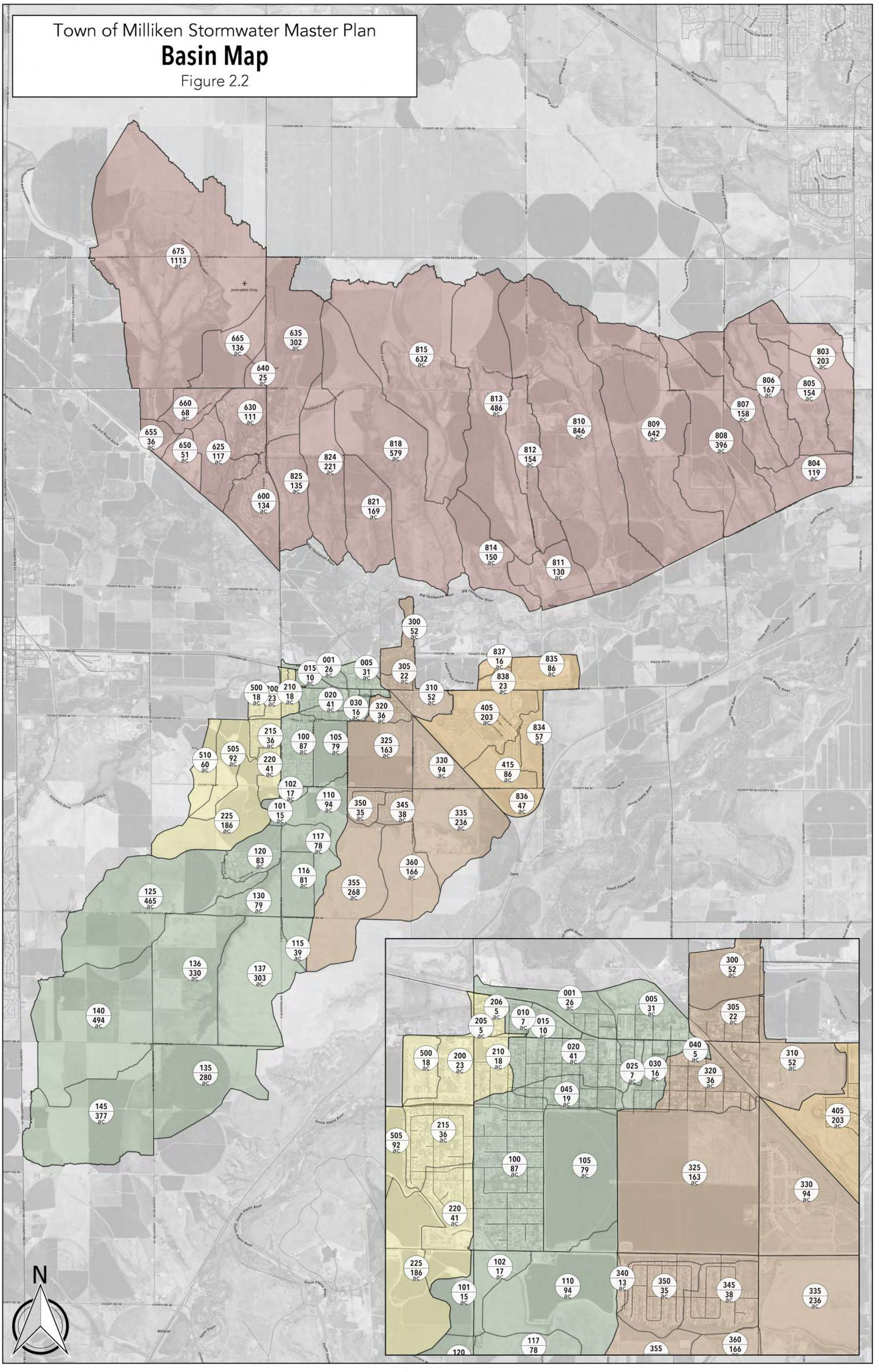
Stormwater is also inadvertently intercepted by several existing irrigation ditches located in Milliken. The Little Thompson Ditch is located south of Town, bordering the Centennial Farms subdivision. The Hillsboro Canal, and several of its laterals, flow just south of the Frank Farms subdivision, before joining the Little Thompson Ditch upstream of Centennial Farms. The Platte/Thompson Ditch is located north of State Highway 60, and presents an impediment to flows, since few crossing structures exist over or under this canal. The Beeline Ditch flows under Quentine Avenue just south of Broad Street before joining the Platte/Thompson Ditch.

There are also several railroads within the Town. The Union Pacific Railroad (UPRR) owns a mainline that crosses east of Town, running to the north and west, crossing Alice Avenue, Broad Street, and the Big and Little Thompson Rivers. This railroad embankment also serves as a pond embankment for Ehrlich Lake. The UPRR also owns a spur line approximately two blocks north of Broad Street, which parallels Broad Street to the west. Both of these railroad lines impede the Western, Eastern, and Lola Park Tributaries natural flow paths.

Town of Milliken Stormwater Master Plan

Basin Map

Figure 2.2



2.2 Land Use

Zoning data was provided by the Town of Milliken for use on this project. Zoning maps were provided in pdf format and digitized for use in GIS software. Table 2.1 below lists the impervious values listed for various land uses. Land use values were applied consistently with other planning studies, specifically the *Hydrologic Analysis of the Box Elder Creek/Cooper Slough Watershed* (Reference 2). Detailed watershed parameters are discussed in Section 3 of this report.

Existing land uses were based on current zoning and development levels. Currently developed areas consist mainly of medium density, single-family residential areas in addition to some estate lot residential housing. Commercial uses are mainly limited to areas within one block of Broad Street, with the exception of a commercial strip mall along Alice Avenue just south of SH60. Some industrial uses exist, mainly in the Big Thompson Tributary. The majority of the areas within the Town boundary are currently undeveloped, existing as open rangeland or irrigated cropland.

Future imperviousness values were determined based on zoning, and a map entitled "Estimated Milliken Growth", provided by the Town (included in Appendix D). This map shows areas within the Town boundary that are currently under construction, have pending development applications, expected future annexations, and land expected to be developed. For the future land use conditions, impervious values anticipate development based on land use and zoning information collected from the Town. Inside the Old Town area, the watershed is primarily developed, resulting in similar land use for both existing and future conditions. South of Old Town, higher impervious values result from the planned development areas.

Table 2.1 – Land Use Values

Land Use Description	% Impervious	Land Use Description	% Impervious
Agricultural	2	Mixed Use Commercial	95
Agricultural Estate	28	Planned Unit Development	28-45*
Office District	95	Single Family Residential	35
General Business District	95	Single Family Estate Residential	38
Service Business District	85-95	Two-Family Residential	30
Light Industrial District	80	Multi-Family Residential	45-75*
Medium Industrial District	90	Mobile Home Community District	30

* Imperviousness of PUD and Multi-Family uses calculated on a case-by-case basis

2.3 Outfall & Tributary Description

Due to the various outfall locations along the Little Thompson and Big Thompson Rivers, drainage areas tributary to the Town have been broken into 5 tributaries, the Western Tributary, the Lola Park Tributary, the Eastern Tributary, the Big Thompson Tributary, and the Northern Tributary. Generally, stormwater runoff is conveyed by open channels higher in the basin. Where runoff enters the developed portion of the Town, it is generally split between open channel (streets and drainage channels) and storm sewer conveyance.

Western Tributary

The Western Tributary is located on the far west edge of Milliken, originating approximately one-half mile south of County Road 46 near County Road 19, and is approximately 400 acres in size. Development within the Western Tributary consists of medium density single family development and farmland, with an existing weighted imperviousness of approximately 12%. Based on the Estimated Milliken Growth map, development is expected to increase in the Western Tributary with the expansion of the Pheasant Hills subdivision and the construction of the Purvis and Dove Valley PUDs, causing the future imperviousness to increase to 32%.

Photo 1 – Western Tributary Crossing of State Highway 257

Runoff originating from the Western Tributary is conveyed through overland flow, where it crosses the Hillsboro Canal and the Little Thompson Ditch near County Road 46. Flows then collect in the Frank Farms subdivision at the S. Ursula Court cul-de-sac, where they split to the north and east. A storm sewer in Quentine Avenue intercepts a portion of the 100-year discharge, with the remainder conveyed by the swales along Quentine. This storm sewer eventually daylights near the intersection of State Highway 257 and Quentine before outfalling to the Little Thompson River.

Photo 2 – Fire Station Culvert

Lola Park Tributary

The Lola Park Tributary is approximately 3,050 acres in size, and originates near the intersection of County Road 17 and County Road 40, approximately 4 miles south of Johnstown. Development within the watershed is currently dominated by farmland, in addition to the Wildcat Acres subdivision. Inside the Town limits, development consists mainly of single family residential in the Old Town area, with some commercial uses. The existing weighted imperviousness of the basin is only 6%, due to the large tracts of undeveloped land. Significant development is expected to occur in the upper Lola Park watershed. Imperviousness is expected to increase to

approximately 21% in the future.

The Lola Park Tributary is conveyed via open channel flow from County Road 42 until runoff is intercepted by a sump in the Pheasant Hills development. This sump does not have a formal outlet structure, and is very large, with a capacity of approximately 171 ac-ft, according to SWMM modeling results. Spills from this sump travel north across County Road 46, where S. Irene Avenue diverts a small portion of the discharge north towards Lola Park, with the majority of the flows directed to the Eastern Tributary. Downstream of Lola Park, discharges are conveyed by both open and closed conduits before crossing the Platte/Thompson Ditch and outfalling into the Little Thompson River. The Milliken Fire Station improvements in 2007-2008 included a 10'x3' box culvert and a small detention pond on the Lola Tributary. An existing corrugated metal culvert conveys undetermined irrigation return flows out of Lola Trib downstream of the Fire Station culvert.

Eastern Tributary

The Eastern Tributary is located east of the Lola Park Tributary, originating south and east of the intersection of Quentine Avenue and County Road 44. It is approximately 1,175 acres in size, and contains a mixture of farmland and residential development. The Centennial Farms and Colony Pointe developments are located in the Eastern Tributary, as well as the eastern portion of Old Town Milliken. Its current imperviousness is estimated at 13%, with significant development expected to occur in the future. According to the Estimated Milliken Growth map, the majority of the watershed is zoned for residential development, causing the imperviousness to increase to 43%.

Runoff from the Eastern Tributary is collected by a pick-up ditch just south of the Hillsboro Canal at Centennial Farms, as noted in the Final Drainage Report for the Centennial Farms Subdivision (Reference 3). This ditch conveys off-site flows around Centennial Farms to the east, nearly to the Union Pacific Railroad. At that point, they cross County Road 46 to the north, and discharge into Ehrlich Lake. As noted above, spill flows from the Lola Park Tributary are also conveyed by the Eastern Tributary. These flows originate from a flow split on the Lola Park Tributary near S. Irene Avenue and County Road 46. They are conveyed via overland flow to the intersection of Alice Avenue and the Union Pacific Railroad (UPRR), where they spill into Ehrlich Lake. A small pipe, insufficient to convey the 100-year discharge, crosses the railroad at this point. Downstream of the railroad, a concrete lined ditch in poor condition conveys flows to the Big Thompson River (photo 3).

Photo 3 – Eastern Tributary Outfall Ditch

Northern Tributary

Located north of Milliken, the Northern Tributary is a collection of individual ephemeral streams, rather than a single watershed. It covers an area of approximately 6,320 acres, and consists mainly of relatively steep farmland. The Mad Russian Golf Course is located on the west side of the watershed, and is surrounded by single family residential housing. With that exception, the Northern Tributary is almost entirely undeveloped. Its existing imperviousness is estimated at only 3%, with the future imperviousness expected to increase to only 6%, due to some expected development around the golf course, the Homestead at Ashton subdivision, and a general business development.

In the Northern Tributary areas, runoff is conveyed almost entirely through open channel flow and roadway culverts, since the majority of these areas are undeveloped. In the development surrounding the golf course, flows are conveyed via roadside swales before outfalling into the Big Thompson River.

Big Thompson Tributary

The Big Thompson Tributary is located east of the UPRR, generally between County Road 46 and the Big Thompson River. It is approximately 517 acres in size, and consists mainly of the Settler's Village development and industrial land uses. Its current imperviousness is estimated at approximately 35%, with the future imperviousness expected to increase to approximately 68%, due to the industrial zonings. The Settler's Village development, currently under construction, was considered as fully developed for the existing hydrologic analysis.

Runoff from the Big Thompson Tributary is conveyed in storm sewers through Settler's Village to Centennial Lake. Discharges from the lake are released at a controlled level, crossing under SH60 before outfalling to the Big Thompson River. Runoff from subwatersheds 415 (the southern half of Settler's Village) and 836 discharge east under the UPRR, outfalling to the South Platte River. The Settler's Village south pond is located in subwatershed 415, which detains runoff from the development before discharging under the UPRR.

2.4 Flood History

The 1982 stormwater master plan references several past flooding events affecting the Town. These include a rainfall event in June of 1981 which resulted in 2 to 2.5 inches of rainfall over the watershed. This event caused localized, limited damages, including several roadway washouts, but no major structural damage reported. Another event was noted in June 1982, when up to 3 inches of rain fell in one hour. This storm damaged approximately 50 structures, and overtopped the Union Pacific railroad on the Eastern Tributary, in addition to extensive private and public damages along County Road 23.

Milliken was also severely impacted by the flood of September 2013. Between September 10 and September 14, 2013, a rain gage in the Lola Park Tributary recorded a total of 4.28" of rain, 2.2" of which occurred on September 12. Flooding below Broad Street was widespread, due to overflows from the Little Thompson River. These flows caused structural damage to the UPRR crossing at the Little Thompson River, as well as the spur line that parallels Broad Street. Flooding from the Little Thompson also caused the intersection of Broad Street and Quentine Avenue to flood (photos 4-7).

Photo 4 – Solomon Mobile Home Park

Photo 6 –N. Josephine Ave. at Broad Street

Photo 4 – Intersection of Quentine Ave and Broad Street

Photo 7 – Structural Damage to N. Quentine Ave. at the Little Thompson River Crossing

SECTION 3.0 HYDROLOGIC ANALYSIS

3.1 Overview

This study will update the Town of Milliken hydrology for the 2-, 5-, 10-, 25-, 50-, 100-, and 500-year storm frequencies under both existing and future development conditions. The Colorado Urban Hydrograph Procedure (CUHP) version 1.4.3 was used to develop runoff hydrographs from individual sub-watersheds within each watershed. The EPA Stormwater Management Model (SWMM) version 5.0.22 was used to route the hydrographs through the watershed.

The study area for Milliken encompasses 19.8 square miles, divided into five main flow paths. A total of 81 subwatersheds are included in the hydrologic analysis. The average watershed size is approximately 156 acres. Due to the size of the watersheds, a 5-minute unit hydrograph was used in CUHP, per recommendations in the Urban Storm Drainage Criteria Manual (USDCM – Reference 4). For the current update, the overall watershed boundary was determined to be very similar to the watershed boundary used for the 1982 stormwater master plan, although the subwatershed delineations were slightly different.

3.2 Design Rainfall

The 2-, 5-, 10-, 25-, 50, 100, and 500-year rainfall depths were verified from the NOAA Atlas 2 – Precipitation-Frequency Atlas of the Western United States, Volume III -Colorado (Reference 5), as recommended by the Urban Drainage and Flood Control District (UDFCD) for areas outside of the district boundary, as was done for the 1982 stormwater master plan. These values were verified for the current study and found to be in conformance with the NOAA Atlas and current modeling practices; therefore, they were carried forward for use. Aerial adjustments were not applied, as the total tributary area to any design point is less than 10 square miles.

Table 3.1 –1-Hour Rainfall Depths

Return Period	Rainfall Depth (in)
2- year	0.97
5- year	1.33
10- year	1.60
25- year	1.95
50- year	2.30
100- year	2.56
500- year	3.40

Note: These figures do not reflect any adjustments due to the 2013 Flood Event.

Please note that NOAA has recently updated their rainfall atlas with revised rainfall values. However, the updated values are not endorsed for use by the UDFCD, as outlined in a recent position letter (Reference 6) by the UDFCD. Since these values are not advised for use by the UDFCD, and since the Town of Milliken has adopted UDFCD criteria, the older values were utilized.

3.3 Subwatershed Characteristics

For the current study, subwatershed boundaries were re-drawn based on the LiDAR topography described above. Initially, the subwatersheds were delineated based on 10-foot contour mapping, and the 2- or 1-foot mapping was reviewed as necessary to adjust the boundaries. The subwatersheds range from 4.8 acres to 1,114 acres, with an average size of 156 acres. Generally, subwatersheds in developed areas of Town are delineated on a finer basis than the undeveloped areas. Areas outside of the Town boundary directly tributary to the Big or Little Thompson Rivers were excluded from this study. Additionally, the canals within the study area were assumed to be flowing full during a rainfall event, as was done with the 1982 stormwater master plan. Therefore, their influence on basin delineation was ignored.

Imperviousness for each subwatershed was based on the updated land use and zoning information described in Section 2.2. For the future conditions, percent impervious values were generated to reflect anticipated future development based on land use and zoning information from the Town of Milliken. Impervious percentages were applied from recommendations presented in the USDCM, or taken directly from drainage reports, as applicable. For developed areas, impervious values were generally similar to the values used in the 1982 stormwater master plan. However, the current study reduced the impervious values of the undeveloped areas, from 7% to 2%, based on UDFCD recommendations and current practices. Modeling parameters such as subwatershed length, distance to centroid, and slope were calculated using a GIS interface. These parameters are summarized in Table A.2, located in Appendix A.

Several differences were noted in the hydrologic parameters between the 1982 stormwater master plan and current recommendations from the USDCM. Specifically, the 1982 stormwater master plan used infiltration rates significantly higher than recommended by current practice, and decay rates significantly lower than current practice. These parameters were revised to ensure consistency with current UDFCD recommendations. Additionally, the depression losses were decreased from 0.4” to 0.35”, per current recommendations.

3.4 Hydrograph Routing

Individual hydrographs developed for each subwatershed were routed throughout the basin using the EPA-SWMM program. Routing elements in SWMM consist of a system of channels, pipes, and storage elements. Conduit dimensions were determined through a GIS interface and current topographic mapping, in addition to field surveys. Roughness coefficients were selected in accordance with recommendations presented in the USDCM.

Five detention facilities were included in the SWMM modeling. These ponds include the Centennial Farms pond, Centennial Lake, Ehrlich Lake, the Settler’s Village south pond, and the Pheasant Hills sump. Storage volumes for all detention areas were taken from the LiDAR contour mapping. For the Centennial Farms and Settler’s Village ponds, and Centennial Lake, the outflow characteristics were taken from their individual drainage reports. All three of these

ponds limit their 100-year release to a maximum of 6 cfs. For the Pheasant Hills sump and Ehrlich Lake, the outflow characteristics were calculated based on field surveys and outlet dimensions. The Pheasant Hills sump does not have a controlled outlet, but rather fills to an elevation of approximately 4793' before spilling to the north across the Hillsboro Canal.

A total of two detention basins were included in the 1982 stormwater master plan. These include two small ponds on the Lola Park tributary. Based on current UDFCD eligibility criteria, neither pond was included for the current hydrology update.

3.5 Previous Studies and Results of Analysis

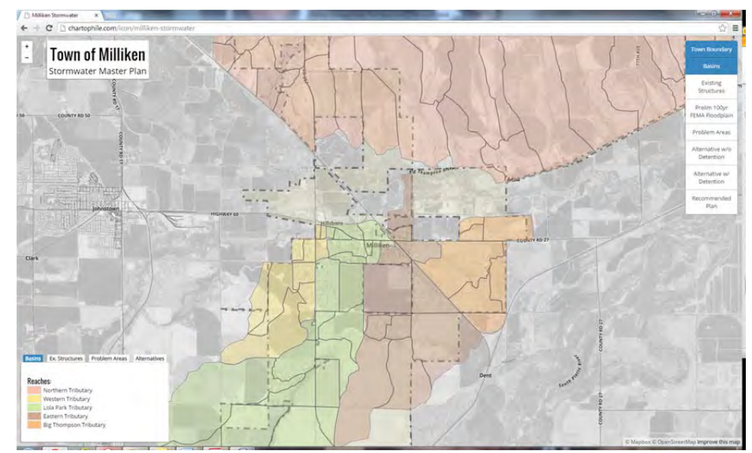
A summary of the hydrologic analysis can be found in Appendix A. The 1982 stormwater master plan is the only previous source of hydrologic results from the area, so comparisons are made at select design points between the current and previous studies. It was found that the current update results in higher peak discharges in all areas than the 1982 stormwater master plan. The 1982 stormwater master plan used SWMM to generate runoff hydrographs, whereas the current update uses CUHP, which can introduce differences in the peak runoff rates due to differences in the software. The current update also uses a lower infiltration rate than previously estimated, causing additional runoff to occur.

Changes were also made to the runoff routing for the current update. As mentioned above, the Lola Park Tributary is diverted near S. Irene Avenue and County Road 46. The majority of the 100-year discharge is routed east towards Alice Avenue. This diversion was not modeled in the 1982 stormwater master plan, causing discharges along Alice Avenue to increase significantly. Increased development in the Western and Lola Park Tributaries have also caused an increase in runoff rates. Table 3.2 includes a brief flow comparison, selected at locations that were directly comparable.

Table 3.3 also includes a summary of existing and future discharges across all return periods at selected design points in the watershed. Note that the Northern and Big Thompson tributaries are not included in this table, since they mostly consist of independent subwatersheds, rather than a specific drainageway.

Table 3.2: Comparison with Previous Study, 100-Year Discharges

Location	1983 Study Future Conditions (CFS)	2014 Existing Conditions (CFS)	2014 Future Conditions (CFS)
Lola Park @ Green St	267	337	401
UPRR @ CR23 (south)	137	1361	1568
UPRR @ CR23 (east)	50	1297	1497
CR21 @ Green St	34	268	388
Lola Park @ Broad St	272	467	481
Western Flow Path @ HW257	142	332	433
Lola Park Tributary North of Town	333	720	792
Eastern Flow Path, CR23 @ Thompson & Platte Ditch	65	1360	1569



Basin delineations are provided in the Appendix and the online mapping page.

Table 3.3: Summary of Peak Flows

		Existing Conditions Peak Flows (cfs)							Future Conditions Peak Flows (cfs)						
Location	**SWMM Junction**	**2 yr**	**5 yr**	**10 yr**	**25 yr**	**50 yr**	**100 yr**	**500 yr**	**2 yr**	**5 yr**	**10 yr**	**25 yr**	**50 yr**	**100 yr**	**500 yr**
Western Tributary															
Hillsborough Ditch Crossing	225	2	29	51	99	134	170	257	29	70	101	168	218	264	385
S. Quentine @ Green St.	941	16	53	82	157	211	268	403	47	102	143	250	318	388	571
S. Quentine @ SH257	946	27	68	104	184	240	313	467	56	118	169	273	385	433	531
Lola Park Tributary															
County Road 46 & County Road 42	145	6	56	97	187	253	321	486	6	56	97	187	253	321	486
CR44	135	7	72	119	223	301	372	559	92	202	281	438	563	665	961
CR21	130	22	293	557	1113	1557	2014	3134	147	467	741	1356	1830	2322	3518
Pheasant Hills Sump Outflow	918	0	0	0	409	846	1315	1718	0	0	95	584	1074	1557	1718
Lola Park	950	21	67	113	224	282	337	482	80	135	174	270	338	401	570
Elm Street	901	21	67	113	224	282	359	482	80	135	174	270	361	401	570
Broad Street	916	32	84	137	269	341	467	588	92	156	204	321	466	481	687
Platte/Thompson Ditch	905	32	84	137	269	341	494	588	92	156	204	321	491	496	687
UPRR	1	67	143	219	407	533	720	928	136	241	313	492	676	792	1060
Eastern Tributary															
CR23	360	7	84	144	280	379	478	723	172	336	453	698	886	1051	1503
County Road 46	957	17	117	206	424	582	743	1269	243	470	641	1031	1320	1584	2294
Diversion from Lola Park	956	2	21	42	354	810	1297	1788	82	146	206	518	1009	1497	1712
Ehrlich Pond Inflow	Ehrlich	80	148	264	544	968	1549	2412	289	572	812	1369	1698	1881	2327
UPRR @ Alice Avenue	959	0	0	1	96	707	1361	2126	0	14	42	407	1058	1568	2039
Little Thompson River	BT035	62	100	131	193	711	1371	1644	63	101	132	409	1068	1585	1658

SECTION 4.0 HYDRAULIC ANALYSIS

4.1 Evaluation of Existing Facilities

Hydraulic analysis of existing infrastructure within the Town of Milliken was performed in order to determine the capacity and approximate return periods of conveyance systems and detention ponds. Several modeling programs were used to complete this analysis, most notably EPA-SWMM 5.0.22, FLO-2D Pro, and FlowMaster. The capacity of existing closed conduit systems was estimated from SWMM computations generated as part of the hydrologic analysis of this report. Inlet control nomographs were used with the project mapping to estimate culvert capacities where necessary. Detention ponds were modeling using SWMM as part of the hydrologic analysis.

4.2 Existing Drainage Facilities

Existing drainage facilities throughout the Town vary in size, shape and material. Capacity of the existing infrastructure also fluctuates and is generally undersized compared to the future conditions discharges. In the undeveloped portions of Town, there is a near-complete lack of infrastructure entirely. For example, 'texas crossings' at several gravel roads where no culverts have been installed at the low point of the creek or swale. Table 4.1 includes an inventory of the existing drainage infrastructure in the Town, as well as its approximate capacity and return period.

Western Tributary

Drainage facilities in the Western Tributary are generally limited to S. Quentine Avenue. In the year 2000, a storm sewer system was constructed in Quentine, consisting of HDPE pipe ranging from 60" diameter at Broad Street, to 30" at S. Lilac Street. This storm sewer uses a series of area inlets along Quentine to intercept runoff. Discharges above the capacity of this pipe are conveyed by the shallow roadside ditches along Quentine. At Broad Street, this system connects to a 76" x 48" horizontal elliptical pipe that crosses under the Beeline Ditch and daylights just south of SH257. At this point, a double 10'x6' box culvert conveys discharges under SH257. Directly downstream from SH257, the Western Tributary passes under the UPRR with a double 48" RCP culvert.

Lola Park Tributary

Drainage infrastructure in the Lola Park Tributary consists of a mixture of open- and closed-conduit conveyance, all of which are undersized for the 100-year developed runoff. Runoff overtops County Road 42 and County Road 44, as well as S. Quentine Avenue, before ponding in the Pheasant Hills sump, located just east of Quentine at the Wildcat Acres subdivision. This sump area is owned by the Town, and was constructed when a local developer needed fill dirt, according to Town anecdotes. It does not contain a formal release structure to control discharges. Rather, it fills to a depth of approximately 10 feet before spilling north across the Hillsboro Canal. The canal was assumed to be flowing full during a rainfall event, and as a result, any conveyance capacity in the canal was ignored. According to SWMM results, shown in Table 3.4, the pond does not discharge until the existing 10-year runoff event is exceeded, or the future 5-year event.

Runoff continues north, overtopping County Road 46 due to the lack of a crossing structure in this location. It then travels a short distance to S. Irene Avenue, before again overtopping Irene due to a lack of a formal crossing structure. A small borrow ditch on the west side of Irene intercepts a small portion of the 100-year event, routing these flows north to Lola Park, with the remainder of the discharge flowing to the north and east, towards Alice Avenue.

At Green Street, a small ditch conveys flows from the Wal Mar development east to Lola Park, where they combine with flows from the higher tributary area. A moderately sized open channel conveys runoff to the northeast corner of Lola Park, where a double 54" RCP culvert intercepts the majority of the 100-year discharge in this area. Overflows travel north on Irene. Downstream of Forest Street, the double 54" culvert discharges into an open channel, which conveys flows to Elm. A double 66"x44" horizontal elliptical pipe crosses Elm. Both the Elm Street crossing and the open channel appear to be poorly maintained, due to the accumulation of sediment and overgrowth in the channel. Runoff in excess of the Elm Street culvert capacity spills to Irene, joining spill flows from above. Irene conveys these discharges north across Broad Street. A small bridge conveys flows across the Platte/Thompson Ditch, before outfalling to the Little Thompson River.

Just downstream of Elm, a 10'x3' box culvert was constructed as part of the Fire Station improvements. Downstream of this culvert, a small water quality pond collects flows, where they are conveyed under Broad Street by a double 68"x42" horizontal elliptical pipe. This pipe discharges onto the surface of N. Josephine Avenue, which conveys runoff directly into the Platte/Thompson Ditch. Downstream of the ditch, an open channel carries runoff to the UPRR, crossing under the railroad through a double 54" RCP, where it is conveyed to the Little Thompson River. The surface flows and irrigation ditch intercept are significant constraints to effective stormwater conveyance.

Eastern Tributary

Runoff in the upper portion of the Eastern Tributary is conveyed via overland flow until the Centennial Farms development. At this point, as noted in the "*Final Drainage Report for the Centennial Farms Subdivision"* (Reference 3), a pick-up ditch intercepts discharges from the upper watershed before they cross the Hillsboro Canal, conveying them to the east across County Road 23. At this point, a small ditch carries flows nearly to the intersection of County Road 46 and the UPRR, where a double 5'x3' horizontal elliptical pipe conveys flows north across County Road 46. A larger open channel then conveys flows north to Ehrlich Lake. Prior to Ehrlich Lake, a 48" RCP intercepts a portion of the 100-year discharge, with overtopping discharges conveyed via overland flow to the Lake.

The Eastern Tributary also conveys spill flows from the Lola Park Tributary. These flows originate near S. Irene Avenue and County Road 46. From this intersection, spills are conveyed in a very wide and shallow sheet flow fashion, inundating almost the entire vacant quarter section of unincorporated land east of Irene. Some of these spills over-top Alice and enter Ehrlich Lake, however, some stormwater also flows towards S. Cora Avenue, inundating the intersection of Cora and Forest Street, where they eventually pond at the UPRR embankment near the eastern end of Elm Street.

The UPRR embankment in this area serves as an impediment to the natural flow path of the Eastern Tributary, and there is no cross drainage structure in this area to convey flows east. According to Town officials, this area is a source of frequent ponding.

Ehrlich Lake was constructed as part of the Colony Pointe subdivision in approximately 2001, according to the *"Final Drainage Report for the Colony Pointe Subdivision"* (Reference 8). It provides approximately 152 acre-feet of stormwater detention. The pond outlet consists of a 48" RCP which crosses under the UPRR, and extends north to the intersection of Alice Avenue and Broad Street, where it discharges into a ditch that parallels Alice on the east. This ditch is concrete lined and poorly maintained, although it does have sufficient capacity to convey 100-year existing discharges to the Big Thompson River. However, the crossing structures at the Platte/Thompson Ditch, County Road 48, and County Road 23 are undersized. These crossings consist of a 54" and a-60" pipe repsectively.

The detention pond for the Centennial Farms subdivision was also included in SWMM modeling for the Eastern Tributary. This pond was constructed in the early 2000's as part of the Centennial Farms development. It is relatively small, providing approximately 10 ac-ft of detention volume. Discharges from this pond are conveyed by the open channel which parallels the south side of County Road 46.

Northern Tributary

Runoff in the Northern Tributaries is conveyed by open channels and roadside ditches. Although there are multiple retention/detention ponds in the area, such as at the Mad Russian Golf Course, none of them meet eligibility criteria for regional detention. Runoff is conveyed entirely via open channel flow in the Northern Tributary, with the exception of several culvert crossings.

Big Thompson Tributary

Runoff in this tributary is conveyed by storm sewers in Settler's Village, and by open channels in areas outside the development. Besides the storm sewer in Settler's Village, very little infrastructure exists in the Big Thompson Tributary. Two ponds were included in the SWMM modeling for the Big Thompson Tributary. These include Centennial Lake, and the Settler's Village South Pond. Both of these structures are located in the Settler's Village development, and were constructed in the early 2000's with the surrounding housing. Centennial Lake is at the intersection of CR60 and CR25. It is a relatively large retention/detention area which collects runoff from majority of Settler's Village. The Settler's Village South Pond is approximately one-quarter mile south of Centennial Lake, and it also serves as a retention/detention structure, detaining runoff from the southern portion of the development. They provide a respective 41 ac-ft and 13 ac-ft of detention volume for Settler's Village.

4.3 Flood Hazards

The majority of the flood hazards within the study area have resulted from the elimination of natural flow paths and/or insufficient conveyance capacity of the existing drainage facilities. As the Town has developed over time, the natural flow paths, such as along the Lola Park Tributary, have been encroached or blocked by railroad or roadway embankments. In most cases, cross-drainage is insufficient or non-existent, leading to residual backwater ponding, causing flooding throughout the Town. Inundation areas are mostly limited to residential areas, although commercial property along Broad Street is also at risk. The results of this report generally verify the flood hazards presented in the 1982 stormwater master plan. An inventory of the existing drainage facilities, and their approximate return period prior to overtopping (based on existing conditions hydrology) is shown in Table 4.1. These areas are also identified in Appendix B, and discussed on a tributary-by-tributary basis below.

Table 4.1, Existing Facilities Inventory

Location	Description	Approx. Capacity (cfs)	Q100 Existing (cfs)	Q100 Future (cfs)	Existing Return Period
Western Tributary					
S. Lilac St.	30" HDPE	22	85	132	5
Green St.	60" HDPE	126	268	388	10
Broad Street	60" HDPE	145	305	433	10
Bee Line Ditch	76"x48" HERCP	326	305	433	~100
SH257	2-10'x6' RCBC	622	332	433	100
UPRR	2-48" RCP	340	312	422	100
Lola Park Tributary					
County Road 42	n/a	0	1061	1121	n/a
CR44	n/a	0	1627	1889	n/a
S. Quentine Ave	42"	80	2014	2322	2
Hillsboro Canal	n/a	0	1315	1557	n/a
County Road 46 @ Irene St	n/a	0	1333	1562	n/a
S. Alice Avenue (spill flows)	n/a	0	1297	1497	n/a
Forest Street	2-54" RCP	290	337	401	50
Elm Street	2-66"x44" HERCP	220	359	401	10
Fire Station	10'x3' RCBC	220	396	401	10
Broad Street	2-68"x42" HERCP	280	467	481	10
Josephine Street	n/a	0	494	496	n/a
Platte/Thompson Ditch	38'x1.5' Flume	409	494	496	50
UPRR	2-54" RCP	440	720	792	25
Eastern Tributary					
S. Alice Avenue	36"	35	478	1051	2
County Road 46	2-5'x3' HERCP	270	742	1584	10
UPRR	48" RCP	57	1360	1568	10
Broad Street	48" RCP	57	1360	1568	10
Cherry Street	48" RCP	202	1360	1568	25
Platte/Thompson Ditch	48" RCP	115	1360	1568	10
CR48	54" RCP	145	1360	1568	~25
N. Alice Avenue	60" CMP	200	1360	1568	25

Western Tributary

Flood hazards in the Western Tributary are generally related to insufficient storm sewer capacity along S. Quentine Avenue and the Hillsboro and Little Thompson Ditch crossings. Since there is no formal crossing structure of either of the canals, stormwater will tend to pond and spill via sheet flow to the north, damaging structures in its path, including those in the Dove Valley and Frank Farms subdivisions. The lack of a formalized collection and conveyance system for these upper basin discharges exacerbates flooding in Frank Farms, where up to approximately 40 structures face the potential for inundation.

In Quentine, the existing drainage system, including the swales along the road, are insufficiently sized to convey the 100-year discharge. Flows from the watershed drain to Quentine, overwhelming the existing drainage system. The roadside ditches lacks the capacity to convey these flows, and during the 100-year runoff event, this ditch spills near Green Street, and also near Broad Street, flooding residences to the east of Quentine.

Lola Park Tributary

As shown in Table 4.1, there is minimal conveyance infrastructure in the Lola Park Tributary, with limited storm sewer in Old Town. In the undeveloped areas high in the watershed, runoff overtops the gravel roadways, due to the lack of cross-drainage capacity. As runoff spills from the Pheasant Hills pond, it is uncontrolled, spilling via sheet flow across the Hillsboro Canal lateral that borders the north side of the pond and overtopping a wide stretch of County Road 46. These discharges eventually inundate the entire area bordered by S. Marjorie Avenue, S. Alice Avenue, County Road 46, and Green Street (extended). The majority of these flows are eventually intercepted by the Eastern Tributary, with SWMM modeling indicating that only 55 cfs is actually conveyed to Lola Park.

The hydraulic analysis indicates that the existing 54” pipes exiting Lola Park are slightly undersized for the 100-year runoff event. The open channels and crossing structures between Forest and Broad Streets all lack capacity, spilling once the 10-year event is exceeded. Spill flows from these structures inundate Irene Avenue as they travel north, spreading into Harriet, Grace, and Frances Streets.

North of Broad Street, the existing 2-68”x42” HERCP crossing structure outfalls to Josephine Avenue, where a lack of conveyance infrastructure causes these flows to spread across both mobile home parks adjacent to Josephine. Since these spills are uncontained, many of them are routed around the Platte/Thompson Ditch crossing structure. The culverts at the UPRR also lack the capacity for the 100-year discharge. The convergence of undersized storm sewers and overflow paths occurs at Josephine and Broad Street. With the Platte/Thompson Ditch restricting outflow, the result is a sump condition, in a residential area without auxiliary dry-land emergency access during localized and regional flood events. Existing public and private property is threatened by multiple flood hazards in this area.

Eastern Tributary

Flood hazards in the Eastern Tributary are magnified by the large spill flows from the Lola Park Tributary, estimated at approximately 1,200 cfs. A portion of these flows cross into Old Town at Green Street along Grace, Frances, Ethel, Dorothy, and Cora Avenues, inundating the majority of the Old Town east of Grace Avenue before ponding at the UPRR near Elm Street.

As with the other tributary areas, the lack of formalized crossing structures in the upper portions of the watershed also effects the Eastern Tributary. The 2-5’x3’ crossing of County Road 46 is insufficient, causing roadway overtopping before flows are eventually collected by Ehrlich Lake, along with the Lola Park Tributary spills. Combined, these discharges cause Ehrlich Lake to spill west across S. Alice Avenue, where they parallel the UPRR embankment to a low point near the end of Elm Street. There is no crossing structure at this location, causing runoff to spill across the UPRR to the east. These spills inundate Aragon Court and the intersection of Broad Street and Alice as they travel north, where insufficient cross-drainage capacity at the Platte/Thompson Ditch causes ponding. Once they overtop the Ditch, they flow overland across farmland, potentially inundating the few homes along N. Alice Avenue.

Northern Tributary

Due to the low development density in the Northern Tributary areas, and the general lack of infrastructure, no flood hazards were identified in the Northern Tributary.

Big Thompson Tributary

Flood hazards within the Big Thompson Tributary are mostly caused by spill flows from the Lola Park and Eastern Tributaries, or by insufficient conveyance capacity along N. Alice Avenue. The Eastern Tributary outfall channel parallels the east side of N. Alice. Roadway and canal crossings are insufficient to convey 100-year discharges, causing roadway overtopping. Roadway spill flows generally flow east, inundating farmland in the Tributary. The UPRR embankment west of Settler’s Village causes a large impediment to flows. This embankment spills in several locations, including near County Road 46, causing shallow flooding in the southern portion of Settler’s Village. Runoff from subwatershed 836 is also blocked by a UPRR embankment.

4.4 Previous Analysis

This report incorporates the results of the 1982 stormwater master plan. Information from the previous study was used to identify flood hazards and evaluate the impacts of the updated future conditions hydrology to determine problem locations.

The 2013 Flood Recovery Floodplain and the effective FEMA Flood Insurance Study were also considered in this analysis. However, the hydraulic analyses on the Big Thompson and Little Thompson rivers within those State and Federal products are not re-evaluated in the local stormwater master plan. Those studies are referenced and used to define the boundary condition between local and regional flood hazards. This study benefited from the currency of the flood hazard determinations on the regional flood sources. Typically local or regional data is temporally superior to the other.

SECTION 5.0 ALTERNATIVES ANALYSIS

5.1 Alternative Development Process

Once the drainage problem areas were identified, alternatives were developed in order to mitigate flooding potential and implement the project details set forth by the Town of Milliken. These goals include:

- 100-year conveyance of stormwater, including at roadway crossings
- Increased detention to mitigate changes in hydrology
- Improved water quality
- Recreational & maintenance access

Several broad alternative categories were studied in order to minimize the drainage problem areas within the Town. Not all categories were considered for every reach, due to conditions specific to each tributary. Categories include:

- 100-year conveyance with detention
- 100-year conveyance without detention
- Floodplain preservation
- No improvements recommended

Generally, the 100-year conveyance with detention alternative favors the use of regional detention ponds to minimize required stormwater conveyance, whereas 100-year conveyance without detention alternative relies on larger storm sewer outfall systems to convey discharges. Water quality treatment is included in each detention pond. Property acquisition is generally included on an as-needed basis, either through easements or full acquisition in order to accommodate required stormwater infrastructure. Floodplain preservation was considered in areas where future development may encroach into existing floodplains or streams.

The design and evaluation of the conceptual alternatives was based on criteria set forth in the UDFCD Urban Storm Drainage Criteria Manual and the Flood Plain Information, Drainage Plan and Street Improvement Plan at Milliken, Colorado.

5.2 Alternative Hydrology & Hydraulics

As shown in Table 3.3, the future conditions hydrologic analysis resulted in large increases in the 100-year discharge throughout Town, due to additional development expected south of Town. In order to mitigate these changes in the hydrology, a baseline hydrologic model was created. Based on current development practices, it is expected that as these areas develop, they will be required to provide detention areas sufficient to reduce developed discharges to a level at or below the historic major and minor storm discharge. The baseline hydrologic model includes detention areas sized to reduce future discharges near the existing level on a watershed-by-watershed basis. These ponds are inclusive to each alternative studied, and may not represent the total detention volume required to completely offset the increase in runoff volume or downstream runoff rates expected with future development.

Table 5.1 – Baseline Hydrology Minimum Required Detention

Watershed	Existing 100-year Discharge (cfs)	Future 100-year Discharge (cfs)	Required Detention (ac-ft)
110	112	271	8.2
115	59	138	3.4
116	118	276	6.3
117	138	309	6.1
120	149	229	3.9
130	93	154	5.2
135	372	665	20.4
137	390	689	16.6
225	170	264	7.9
325	168	441	14.3
335	279	775	22.1
355	278	712	27.3
360	225	389	10.7
505	93	198	7.0
836	53	212	6.1

Following the baseline hydrologic analysis, downstream conveyance structures were sized to convey the baseline 100-year runoff event. Normal depth calculations were performed to estimate channel sizes. Open channel sections were assumed to be trapezoidal, with 3:1-4:1 side slopes, in order to minimize required right-of-way (ROW). Flow depths were limited to 5-feet during the 100-year event. Roadway crossings in urbanized areas were sized to convey the 100-year discharge without overtopping. Outside of the urbanized areas, such as across County Road 42, roadway crossings were sized to convey the 10-year discharge, assuming the roadway would be armored to withstand overtopping during the 100-year event. Table 5.2 shows a comparison of the baseline flows to the capacity of the existing infrastructure in the Town.

Table 5.2 – Baseline Peak Flow Comparison at Select Locations

Location	Approximate Capacity (cfs)	Q10 Baseline (cfs)	Q100 Baseline (cfs)
Western Tributary			
S. Lilac St.	22	36	84
Green St.	126	96	210
Broad Street	145	108	230
Bee Line Ditch	326	108	230
SH257	622	108	230
UPRR	340	108	230
Lola Park Tributary			
County Road 42	0	311	1089
CR44	0	490	1639
S. Quentine Ave	80	603	2011
Hillsboro Canal	0	88	1428
County Road 46 @ Irene Street	0	89	1462
S. Alice Avenue (spill flows)	0	74	1471
Forest Street	290	136	392
Elm Street	220	136	391
Fire Station	220	136	391
Broad Street	280	161	460
Josephine Street	0	161	488
Platte/Thompson Ditch	409	161	488
UPRR	440	161	721
Eastern Tributary			
S. Alice Avenue	35	155	486
County Road 46	270	275	750
UPRR	57	37	1619
Broad Street	57	37	1619
Cherry Street	202	37	1619
Platte/Thompson Ditch	115	110	1619
CR48	145	108	1619
N. Alice Avenue	200	107	1619

5.3 Alternative Cost Estimates

In order to develop cost estimates for each alternative, the UD-MP Cost v2.1 spreadsheet was used. This spreadsheet was developed by the UDFCD for use on master planning projects. Estimated costs for construction of proposed improvements are based on UDFCD, CDOT and other agencies bid tabulations for units at a similar quantity. Unit costs were brought to current year using the Colorado Department of Transportation (CDOT) Construction Cost Index (CCI). At the time of this report, the most recently published CDOT CCI was from the second quarter of 2014. Cost estimates for each tributary have been broken down into capital costs and annual operations and maintenance costs. Capital improvements include structural measures, right-of-way, engineering, administrative, contract administration, and a contingency. Table 5.3 summarizes the unit costs from the UD-MP Cost spreadsheet. Costs not shown in the table, such as asphalt patching or other municipal hardscaping or utility costs associated with drainage infrastructure construction, were based on CDOT's 2013 Cost Data Book.

Quantities were based on proposed alternative alignments, using the project mapping and aerial photography. Drainage easements were identified in locations where improvements are recommended, but ownership would remain private. Property acquisition was recommended where easements would encumber large portions of each impacted parcel. Property acquisition costs were derived from Weld County Assessor's data. Easement costs were calculated at 50% of actual sales property value.

It was assumed that canal crossings could be installed using traditional open-cut methods, while railroad crossings would be jacked or bored. Costs for pipe jacking were obtained from recent project bid tabulations.

Limited utility research was conducted to determine conflicts and relocation needs. In general, it was assumed that water lines could be relocated around proposed improvements where conflicts occurred. A lump sum cost of $20,000 was assumed for each waterline relocation. Dewatering was estimated at 1% of the capital cost for each alternative.

Table 5.3 – Master Plan Unit Costs

Cost Data

Item	Unit	Unit Cost 2012 Q1	Adjusted Unit Cost 2013 Q1
Circular Pipes			
12-inch	L.F.	$36.00	$39.00
18-inch	L.F.	$54.00	$58.00
24-inch	L.F.	$72.00	$78.00
30-inch	L.F.	$90.00	$97.00
36-inch	L.F.	$108.00	$117.00
42-inch	L.F.	$126.00	$136.00
48-inch	L.F.	$144.00	$156.00
54-inch	L.F.	$216.00	$233.00
60-inch	L.F.	$240.00	$259.00
66-inch	L.F.	$264.00	$285.00
72-inch	L.F.	$360.00	$389.00
78-inch	L.F.	$390.00	$421.00
84-inch	L.F.	$420.00	$454.00
90-inch	L.F.	$450.00	$486.00
96-inch	L.F.	$480.00	$519.00
102-inch	L.F.	$714.00	$771.00
108-inch	L.F.	$756.00	$817.00
120-inch	L.F.	$840.00	$908.00
Flared End Sections			
12-inch	EA	$710.00	$767.00
18-inch	EA	$920.00	$994.00
24-inch	EA	$970.00	$1,048.00
30-inch	EA	$1,570.00	$1,700.00
36-inch	EA	$1,610.00	$1,740.00
42-inch	EA	$1,700.00	$1,840.00
48-inch	EA	$2,060.00	$2,230.00
Manholes and Inlets			
Manhole, 4' Dia. (Pipe Dia. < 36"), Depth > 15-feet)	EA	$2,900.00	$3,130.00
Manhole, 5' Dia. (Pipe Dia. 36" - 42"), Depth > 15-feet)	EA	$3,900.00	$4,210.00
Manhole, 6' Dia. (Pipe Dia. , Depth > 15-feet)	EA	$4,300.00	$4,650.00
Type B Manhole (Pipe Dia. 48" and larger, deflection < 10 degrees)	EA	$12,000.00	$13,000.00
Type P Manhole (Pipe Dia. 48" and larger, deflection > 10 degrees)	EA	$15,000.00	$16,200.00
Storm Inlet, Type R/Type 14, 5-foot, 10-foot deep avg.	EA	$4,600.00	$4,970.00
Headwalls for Circular Pipes			
See Headwall Table			See Headwall Table
Wingwalls for Circular Pipes			
See Wingwall Table			See Wingwall Table
Box Culverts			
See Box Culvert Table			See Box Culvert Table
Hydraulic Structures			
Grouted Boulders, 36-inch	C.Y.	$190.00	$205.00
Soil Riprap, Type M	C.Y.	$70.00	$76.00
Excavation, Complete-in-Place	C.Y.	$11.00	$12.00
Bedding, Granular Type II	C.Y.	$58.00	$63.00
Grout	C.Y.	$240.00	$259.00
Check Structure, Concrete	L.F.	$270.00	$292.00
Channel Improvements			
Boulder Edging, 12" High	L.F.	$60.00	$65.00
Boulder Edging, 24" High	L.F.	$75.00	$81.00
Boulder Edging, 36" High	L.F.	$90.00	$97.00
Concrete Low Flow Channel	L.F.	$40.00	$43.00
Grouted Boulders, 12"	S.Y.	$130.00	$140.00
Grouted Boulders, 18"	S.Y.	$150.00	$162.00
Grouted Boulders, 24"	S.Y.	$170.00	$184.00
Grouted Boulders, 36"	S.Y.	$190.00	$205.00
Grouted Boulders, 48"	S.Y.	$200.00	$216.00
6-inch Riprap, Type VL	C.Y.	$45.00	$49.00
9-inch Riprap, Type L	C.Y.	$55.00	$59.00
12-inch Riprap, Type M	C.Y.	$60.00	$65.00
18-inch Riprap, Type H	C.Y.	$80.00	$86.00
24-inch Riprap, Type VH	C.Y.	$85.00	$92.00
Soil Riprap, Type VL	C.Y.	$50.00	$54.00
Soil Riprap, Type L	C.Y.	$60.00	$65.00
Soil Riprap, Type M	C.Y.	$70.00	$76.00
Soil Riprap, Type H	C.Y.	$80.00	$86.00
Soil Riprap, Type VH	C.Y.	$90.00	$97.00
Excavation, Low Range	C.Y.	$11.00	$12.00
Excavation, Mid Range	C.Y.	$24.00	$26.00
Excavation, High Range	C.Y.	$31.00	$33.00
Detention/Water Quality Facilities			
Excavation, Low Range	C.Y.	$11.00	$12.00
Excavation, Mid Range	C.Y.	$24.00	$26.00
Excavation, High Range	C.Y.	$31.00	$33.00
Outlet Works	EA	User Defined	User Defined
Water Quality Appurtenances	EA	User Defined	User Defined
Detention (Complete-in-Place)	AC-FT	$45,600.00	$49,300.00
Landscaping and Recreation Improvements			
Wetlands Plantings	ACRE	$25,000.00	$27,000.00
Reclamation & seeding (native grasses)	ACRE	$1,000.00	$1,080.00
Trail/Path, Concrete (10' Width)	L.F.	$44.00	$48.00
Trail/Path, Crusher Fines (10' Width)	L.F.	$11.00	$12.00
Removals			
Removal of culvert pipe (D<48")	L.F.	$20.00	$22.00
Removal of culvert pipe (48"<D<84")	L.F.	$50.00	$54.00
Removal of culvert pipe (D>84")	L.F.	$75.00	$81.00
Concrete Box Culvert	L.F./CELL	$100.00	$108.00
Land Acquisition			
Temporary Easements	EA	User Defined	User Defined
Easement/ROW Acquisition	ACRE	User Defined	User Defined
Concrete and Steel			
Concrete	C.Y.	$600.00	$648.00
Steel	LB.	$0.90	$0.97
Operation and Maintenance			
Culvert Maintenance	L.F.	$1.00	$1.00
Manhole and Inlet Maintenance	EA	$50.00	$54.00
Hydraulic Structure Maintenance	EA	$500.00	$540.00
Channel Maintenance	L.F.	$2.00	$2.00
Detention/WQ Maintenance	ACRE	$1,500.00	$1,620.00
Mowing	ACRE	$50.00	$54.00
Trail Maintenance	L.F.	$5.00	$5.00

5.4 Alternative Plans

Alternative plans were developed to address problem areas depicted in Section 4. Alternative plan drawings are included in Appendix C. The following is a summary of the alternatives evaluated on a reach by reach basis, along with a discussion of their feasibility and project cost estimates.

5.4.1 Western Tributary

Drainage deficiencies in the Western Tributary relate mainly to the lack of canal crossing structures and insufficient storm sewer capacity for the 100-year event. Uncontrolled discharges pond against the Little Thompson Ditch embankment and spill into Frank Farms, inundating homes and streets. The following alternatives were considered for the Western Tributary.

100-year Conveyance with Regional Detention

This alternative will provide 100-year conveyance in S. Quentine Avenue through detention and upsizing of the existing storm sewer in Quentine from Green Street to S. Lilac Street. It includes the construction of an 8 acre-foot detention pond south of Frank Farms to collect runoff prior to spilling over the Little Thompson Ditch. A 60” pipe will pass under the canal, and replace the existing storm sewer from Lilac to Green. It will connect to the existing 60” pipe at Green Street, which has sufficient capacity to convey the 100-year event. Property acquisition will be required in order to construct the proposed detention area.

Capital improvement costs for this alternative are estimated at $3,000,000.

100-year Conveyance without Regional Detention

This alternative proposes a cutoff channel above the Little Thompson Ditch to route runoff around the west side of Frank Farms, which conveys discharges to the Little Thompson River. It will require approximately 3,500 feet of open channel, including a crossing of the Little Thompson Ditch and roadway crossings at Green and Broad Streets, in addition to easement or property acquisition. Since the Beeline Ditch and the Little Thompson River are separated by less than 100 feet at the proposed channel outfall, an overflow weir will be provided to help separate flows between the Ditch and the River. The outfall channel can also serve as future conveyance for the Purvis development west of Frank Farms. This alternative will also alleviate flooding in Quentine, since SWMM modeling indicates that the existing storm sewer is sufficient to convey local discharges.

Capital improvement costs for this alternative are estimated at $1,500,000.

5.4.2 Lola Park Tributary

In the Lola Park Tributary, drainage problem areas are typically caused by lack of conveyance infrastructure or insufficient capacity of the existing drainage system. Development has encroached onto the natural flow path of the tributary, blocking or obstructing runoff from the tributary. The following alternatives were considered during the alternatives analysis.

100-year Conveyance with Regional Detention

This alternative includes the provision of cross-drainage structures higher in the basin to reduce roadway overtopping and related maintenance, since many of these county roads lack crossing structures. In order to help reduce costs along the Lola Tributary, 10-year crossing structures are proposed higher in the basin, in currently undeveloped areas, at County Road 42 and County Road 44. Riprap armoring is proposed to prevent damage to the roadway embankment during the 100-year event. A 100-year crossing is proposed at S. Quentine Avenue to provide emergency access in the event of a large storm. This will also help direct runoff to the Pheasant Hills pond.

Just downstream of Quentine, runoff enters the Pheasant Hills pond. However, a small irrigation ditch just south of the pond intercepts a portion of this runoff. This ditch embankment will be removed or ditch rerouted to allow the entire Lola Park discharge to enter the Pheasant Hills pond, and a drop structure is proposed to safely allow flows into the pond. Providing a formalized outlet structure will help control discharges and reduce surface flooding due to spill flows. In addition to providing a formal outlet structure, this alternative also increases the detention volume of the Pheasant Hills pond to approximately 233 ac-ft, in order to reduce 100-year discharges to a level below the existing conditions, reducing the required downstream conveyance infrastructure. This will also require raising a portion of the berm around the northeast corner of the pond. Since the Pheasant Hills pond falls under state jurisdictional requirements, any improvements to the impoundment must be approved by the Colorado State Engineer’s Office.

Table 5.4 – Lola Park Tributary Improvements, 100-Year Conveyance with Detention

Location	Proposed Structure	Proposed Return Period (Yr)
County Road 42	60"	10
CR44	2-7'x4' RCBC	10
S. Quentine Avenue	5-8'x5' RCBC	100
Hillsboro Canal	10’x5’ RCBC	100
County Road 46 @ S. Irene Street	9’x5’ RCBC	100
S. Alice Avenue	8’x6’ RCBC	100
Forest Street	n/a	100
Elm Street	n/a	100
Fire Station	n/a	100
Broad Street	n/a	100
Josephine Street	2-48”	100
Platte/Thompson Ditch	11-24"	100
UPRR*	54"	100

*in addition to existing infrastructure

An outfall channel is proposed downstream of the Pheasant Hills pond to convey discharges in a controlled manner, including a crossing structure of the Hillsboro Canal and a 100-year crossing structure at S. Irene Avenue and County Road 46. As noted above, the Lola Park Tributary flows have historically divided near this location, with the vast majority spilling towards Ehrlich Lake. Due to this, the decision was made to divert the entire 100-year detained discharge at this location to Ehrlich Lake, since the detained flows are less than what has historically been diverted to this location. This will also lessen required infrastructure along the Lola Park Tributary through the Town. A 100-year crossing structure is also proposed at S. Alice Avenue, before flows outfall into Ehrlich Lake.

Even with the diversion of upstream flows, drainage deficiencies still exist on the Lola Park Tributary in Old Town. Crossing structures at Forest, Elm, and Broad Streets, and the fire station culvert, remain undersized for the 100-year event. Therefore, an additional detention pond is proposed just upstream of Lola Park. This will provide approximately 15 ac-ft of detention storage, and will include water quality treatment. It will also reduce outflows to a level such that the existing infrastructure from Broad Street to Lola Park is sufficient to convey the 100-year discharge.

Downstream of Broad Street, the lack of formal drainage infrastructure causes flooding of the adjacent mobile home parks. A 100-year storm sewer is proposed from Broad to the Platte/Thompson Ditch. Finally, an additional 54" pipe will be required at the UPRR to convey the entire 100-year discharge without overtopping the railroad.

Gravity flow constraints and historic permitting requirements will restrict the range of improvements to the Platte/Thompson Ditch. Hydraulic conveyance under or over the ditch will be limited by specific design and permitting parameters. Therefore, detention of inflows between Broad Street and the Platte/Thompson Ditch will require specific design to maximize hydraulic head for conveyance under the ditch, but also limit depth of ponding to ensure safety and compliant adjacent land uses. Alternative analysis has found that a combination of stormwater flows under and over the Platte/Thompson Ditch can safely convey Lola Tributary flows downstream. This likely results in a piping of the Thompson/Platte Ditch. Siphoning the ditch was considered, but discouraged based on the limited hydraulic head that presently exists at that section of the ditch.

Additional ponding depth upstream of the railroad is a preferred alternative to the permitting and construction constraints of adding additional railroad culverts. However, the existing culverts and upstream topography will limit the ponding to essentially the existing low areas upstream of the railroad. A secondary embankment will be required as the railroad embankment is not designed to withstand asymmetrical hydraulic loads.

Capital costs for this alternative are estimated at $14,200,000.

100-year Conveyance without Regional Detention

This alternative is similar to the 100-year conveyance with detention scenario, with the exception of larger pipe crossings and outfall channels. Upstream of the Pheasant Hills pond, the proposed alternative is identical, since the discharges are the same. Since the Pheasant Hills pond will not be improved, 100-year discharges from the pond will increase due to an anticipated increase in stormwater runoff volumes. Costs for this alternative do not include an increase in detention volume at this location, however, an outlet structure is proposed, in order to help channelize flows across the Hillsboro Canal. The flow split at S. Irene Avenue and CR23 will be eliminated by channelizing flows towards Alice Avenue, in order to reduce required conveyance through the Town.

The existing roadway crossings at Forest, Elm, and Broad Streets are all insufficiently sized to convey 100-year discharges through the Town in this alternative. This will be alleviated by increasing conveyance capacities at these crossings. Downstream of Broad, a proposed storm sewer should extend to the Platte/Thompson Ditch, in order to prevent inundation of Josephine Street. A transition structure will cross under the canal and outfall to a proposed channel which conveys flows to the existing crossing of the UPRR, which will be upgraded to convey 100-year discharges.

Total capital costs for this alternative are estimated at $11,700,000.

Floodplain Preservation

Floodplain preservation along the Lola Park Tributary is recommended in the upper portion of the watershed. From County Road 42 to the Pheasant Hills pond, the existing drainageway is well defined, and will be required to convey discharges from future developments. Setbacks or drainage easements are recommended to maintain this stream corridor, which appears to support a healthy riparian system.

Table 5.5 – Lola Park Tributary Improvements, 100-Year Conveyance without Detention

Location	Proposed Crossing Structure	Proposed Return Period (Yr)
County Road 42	60"	10
CR44	2-7'x4' RCBC	10
S. Quentine Ave	5-8'x5' RCBC	100
Hillsboro Canal	11'x5' RCBC	100
County Road 46 @ Irene Street	10'x6' RCBC	100
S. Alice Avenue	12'x7' RCBC	100
Forest Street	36"	100
Elm Street	66"x44" HERCP	100
Fire Station	2-6'x4' RCBC	100
Broad Street	2-7'x4' RCBC	100
Josephine Street	2-7'x4' RCBC	100
Platte/Thompson Ditch	13-4'x2' RCBC	100
UPRR*	3-54"	100

*in addition to existing infrastructure

5.4.3 Eastern Tributary

Drainage deficiencies in the Eastern Tributary relate, in large part, to the lack of sufficient conveyance capacity at the intersection of Alice Avenue and the UPRR, in addition to the undersized crossing structures downstream of the railroad.

100-Year Conveyance with Detention

Detention at the Pheasant Hills pond has reduced the inflow to Ehrlich Lake, however, SWMM modeling indicates that the lake will still overflow due to the lack of conveyance across the UPRR. Therefore, regional detention ponds are proposed near Alice and Green Street (extended) and also downstream of Centennial Farms, in order to further reduce inflows to Ehrlich Lake. New crossing structures will be required at Alice (at Centennial Farms) and County Road 46. A new culvert is proposed at Ehrlich Lake to provide the required conveyance capacity under the UPRR, eliminating overtopping at Ehrlich Lake. This culvert will extend to Broad Street, where the existing outfall channel will convey flows to the Big Thompson River. According to SWMM modeling, the existing outfall channel along Alice has the capacity to convey the 100-year detained discharges, however, the crossing structures do not. Therefore, a series of box culverts are recommended at each crossing, in order to provide 100-year conveyance capacity.

Capital costs for this alternative are estimated at $20,500,000.

Table 5.6 – Eastern Tributary Improvements, 100-Year Conveyance with Detention

Location	Proposed Crossing Structure	Proposed Return Period (Yr)
S. Alice Avenue @ Centennial Farms	8'x5' RCBC	100
County Road 46	3-5'X4' RCBC	100
UPRR	4-48"	100
Broad Street	4-60"	100
Cherry Street	2-7'X4' RCBC	~100
Platte/Thompson Ditch	2-7'X4' RCBC	~100
CR48	2-7'X4' RCBC	100
N. Alice Avenue	2-7'X4' RCBC	100

100-Year Conveyance without Regional Detention

This alternative proposes the improvement of crossing structures at Alice Avenue (at Centennial Farms), County Road 46, the UPRR, and the crossings downstream of the UPRR in order to alleviate flood hazards in the Eastern Tributary. At Ehrlich Lake, the main cause of flooding is the lack of conveyance capacity under the UPRR. A new outlet structure is proposed to prevent the lake from overtopping Alice to the west. An open channel is proposed from the UPRR to the intersection of N. Alice and Broad Street. North of Broad, new culverts will be required at the 4 existing crossing locations – Cherry Street, the Platte/Thompson Ditch, CR48, and N. Alice Avenue.

Total capital costs for this improvement are estimated at $12,700,000.

Table 5.7 – Eastern Tributary Improvements, 100-Year Conveyance without Detention

Location	Proposed Crossing Structure	Proposed Return Period (Yr)
S. Alice Avenue @ Centennial Farms	8'x5' RCBC	100
County Road 46	4-5'x4' RCBC	100
UPRR	11-48"	100
Broad Street	8-7'x5' RCBC	100
Cherry Street	4-8'x4' RCBC	~100
Platte/Thompson Ditch	5-8'x4' RCBC	~100
CR48	5-8'x4' RCBC	~100
N. Alice Avenue	4-8'x4' RCBC	100

5.4.4 Northern Tributary

As mentioned above, no flood hazards were identified in the Northern Tributary. However, several development areas are expected, including the Waste Management general business area and the Homestead at Ashton subdivision. Future roadways constructed to service these areas should reference this report to ensure adequate cross-drainage capacity.

100-Year Conveyance with Regional Detention

Regional detention is not anticipated in this basin. Development, coordinated with tributary County properties, should provide on-site detention and water quality based on additional impervious area.

100-Year Conveyance without Regional Detention

Proposed culvert crossings are recommended at future roadway crossings of existing arroyos in the northern tributary. The culverts should be sized to pass historic minor and major storm events, presuming upstream properties develop with the required on-site detention for additional impervious area and resulting developed stormwater runoff.

Table 5.8 – Northern Tributary Improvements, 100-Year Conveyance without Detention

Location	Proposed Crossing Structure	Proposed Return Period (Yr)
Watershed 804	7'x6' RCBC	100
Watershed 805	5'x'6 RCBC	100
Watershed 808	6'x6' RCBC	100
Watershed 809	8'x6' RCBC	100
Watershed 810	9'x6' RCBC	100
Watershed 811	9'x6' RCBC	100

Capital costs for this alternative are estimated at $1,100,000.

No Improvements Recommended

This alternative was considered for the Northern Tributary, since the area is sparsely developed.

5.4.5 Big Thompson Tributary

Flood hazards in the Big Thompson tributary are mainly caused by spill flows from the Lola Park and Eastern Tributaries. Discharges in this tributary are generally controlled by Centennial Lake and the Settler's Village south pond. Future detention will be required in subwatershed 836, which has been accounted for in the baseline hydrology.

100-Year Conveyance with Regional Detention

Regional detention is not anticipated in this basin. Development, coordinated with tributary County properties, should provide on-site detention and water quality based on additional impervious area.

100-Year Conveyance without Regional Detention

Detention above the baseline, existing facilities was not considered in this Tributary. Conveyance improvements for the 100-year event consist solely of a new 36" crossing under the UPRR for subwatershed 836.

Capital costs for this alternative are estimated at approximately $600,000.

No Improvements Recommended

Since most flood hazards in the Big Thompson Tributary are caused by spills from other areas, this alternative was also considered. Improving conveyance capacity in the Lola Park and Eastern Tributaries will correct most of the deficiencies in this tributary.

Table 5.9 – Alternative Cost Summaries

Alternative	Capital Improvement Cost	ROW/Easements	Engineering (15%)	Legal/Administrative (5%)	Contract Admin/Construction Mgmt (10%)	Contingency (25%)	Total Improvements	Annual Maintenance	50-Year Maintenance
Western Tributary									
100-Year Conveyance with Detention	$ 1,956,763	$ 7,580	$ 293,514	$ 97,838	$ 195,676	$ 489,191	$ 3,040,562	$ 8,316	$ 415,800
100-Year Conveyance without Detention	$ 960,597	$ 10,479	$ 144,090	$ 48,030	$ 96,060	$ 240,149	$ 1,499,405	$ 4,630	$ 231,500
Lola Park Tributary									
100-Year Conveyance with Detention	$ 9,172,950	$ 18,535	$ 1,375,943	$ 458,648	$ 917,295	$ 2,293,238	$ 14,236,609	$ 12,344	$ 617,200
100-Year Conveyance without Detention	$ 7,569,965	$ 2,112	$ 1,135,495	$ 378,498	$ 756,997	$ 1,892,491	$ 11,735,558	$ 9,140	$ 457,000
Eastern Tributary									
100-Year Conveyance with Detention	$ 13,203,249	$ 24,527	$ 1,980,487	$ 660,162	$ 1,320,325	$ 3,300,812	$ 20,489,562	$ 9,535	$ 476,750
100-Year Conveyance without Detention	$ 8,158,231	$ 9,624	$ 1,223,735	$ 407,912	$ 815,823	$ 2,039,558	$ 12,654,883	$ 3,450	$ 172,500
Northern Tributary									
100-Year Conveyance without Detention	$ 699,977	$ -	$ 104,997	$ 34,999	$ 69,998	$ 174,994	$ 1,084,965	$ 1,920	$ 96,000
Big Thompson Tributary									
100-Year Conveyance without Detention	$ 385,000	$ -	$ 57,750	$ 19,250	$ 38,500	$ 96,250	$ 596,750	$ 595	$ 29,750

The costs presented above compare with and without detention alternatives for specified tributary basins.

SECTION 6.0 RECOMMENDED PLAN

6.1 Plan Description

The engineer's recommended plan is outlined below. For an illustration of the plan, see Figure 6.1 below and the online map: http://chartophile.com/icon/milliken-stormwater This webpage can be transferred to a city based website at any time.

Western Tributary: 100-Year Conveyance without Detention

The recommended plan for the Western Tributary is 100-Year Conveyance without Detention. It was selected on the basis of cost and its multi-use benefits, which include conveyance capacity for future development. In addition, conveying runoff in the proposed open channel will provide a water quality benefit to the reach.

Lola Park Tributary: 100-Year Conveyance without upstream Detention, Lola Park Pond, Pheasant Hills Outlet Structure, Floodplain Preservation

The recommended plan for the Lola Park Tributary is 100-Year Conveyance without upstream Regional Detention, due to the anticipated cost of publicly owned upstream detention facilities. Some elements of the 'with Regional Detention' alternative are also included, in order to reduce overall plan costs. For instance, the construction of the Lola Park pond, estimated at approximately $1M, will reduce discharges through Town. Proposed improvements required to convey the non-detained discharges are estimated at nearly $3M. Therefore, the construction of the Lola Park Pond will reduce the cost of conveyance improvements through Town by approximately $2M. Formalizing detention at Pheasant Hills through the construction of an outlet structure and raising the northeast berm will also significantly reduce downstream flows, resulting in a cost savings for the Eastern Tributary. Floodplain preservation in the upstream reach of Lola Park tributary channel is also included in the recommended plan.

This recommendation is congruent with existing flood recovery plans. The downstream end of Lola Tributary is co-located with regional flood hazards from the Little Thompson River. Regional flood mitigation can be designed to provide the highest benefit cost when it doubles as an effective outlet for local stormwater.

Eastern Tributary: 100-Year Conveyance without Detention

For the Eastern Tributary, the recommended plan is 100-Year Conveyance without Regional Detention. The recommended plan reduces potential land acquisition and detention costs within the tributary. With the inclusion of the Pheasant Hills outlet structure, flows in the Eastern Tributary have been reduced, resulting in additional savings to the 'without regional detention' alternative shown above.

Northern Tributary: No Improvements Recommended

No improvements are currently recommended for the Northern Tributary. Individual development will be responsible for on-site detention and water quality requirements.

Big Thompson Tributary: No Improvements Recommended

Since most flood hazards in this tributary are caused by deficiencies in other tributaries, no improvements are recommended for the Big Thompson Tributary. Hazard areas will be improved through increased conveyance capacity in the Eastern and Lola Park Tributaries.

6.2 Water Quality Impacts

Since there are currently few stormwater BMP's in the Town of Milliken, the recommended plan will help increase water quality. As the upper portions of the watershed develop, the detention areas shown in Table 5.1 will treat runoff from new developments. The implementation of these detention areas will ensure that the majority of the Lola Park Tributary is treated for water quality, and much of the Western and Eastern tributaries will also be treated. The recommended plan generally favors open channel flows, for instance, the Western Tributary cutoff ditch, which also help increase water quality.

6.3 Operations and Maintenance

Maintenance and inspection is an essential part of all studied alternatives. In order for the proposed alternative to function properly, conveyance capacities must be maintained. The deposition of sediment in pipes, open channels, and detention areas reduces the effectiveness of the improvements and increases the probability of flood damages throughout the study area. Yearly and long-term maintenance costs have been included in each cost estimate.

Since there is currently relatively little drainage infrastructure in the Town of Milliken, it is likely that the additional regional improvements recommended herein will increase required maintenance within the Town. However, these facilities will reduce flooding and flood-related damages in the Town, reducing maintenance and clean-up activities associated with flooding.

It is recommended that future channel alignments include maintenance access trails incorporated into the cross-section. These trails greatly increase maintenance access while providing multi-use benefits for residents of the Town. Equipment, manpower, and permit authority are other considerations of the operation and maintenance of the recommended improvements. Existing equipment and manpower should be evaluated as recommended improvements are designed. For instance, is the maintenance access width compatible with the Town's existing equipment? Permit authority is an administrative process to ensure Town work is compliant with building, environmental, and floodplain ordinances. The existing Town ordinances provide for emergency operation and maintenance, but should be evaluated for allowance of routine maintenance.

6.4 Environmental and Safety Assessment

Implementation of the selected plan will reduce peak flow rates, reduce flood hazards and flooded areas, and increase emergency access through reduced street flooding. The construction of open channels will also improve environmental and recreational conditions throughout the watershed, thereby enhancing neighborhoods.

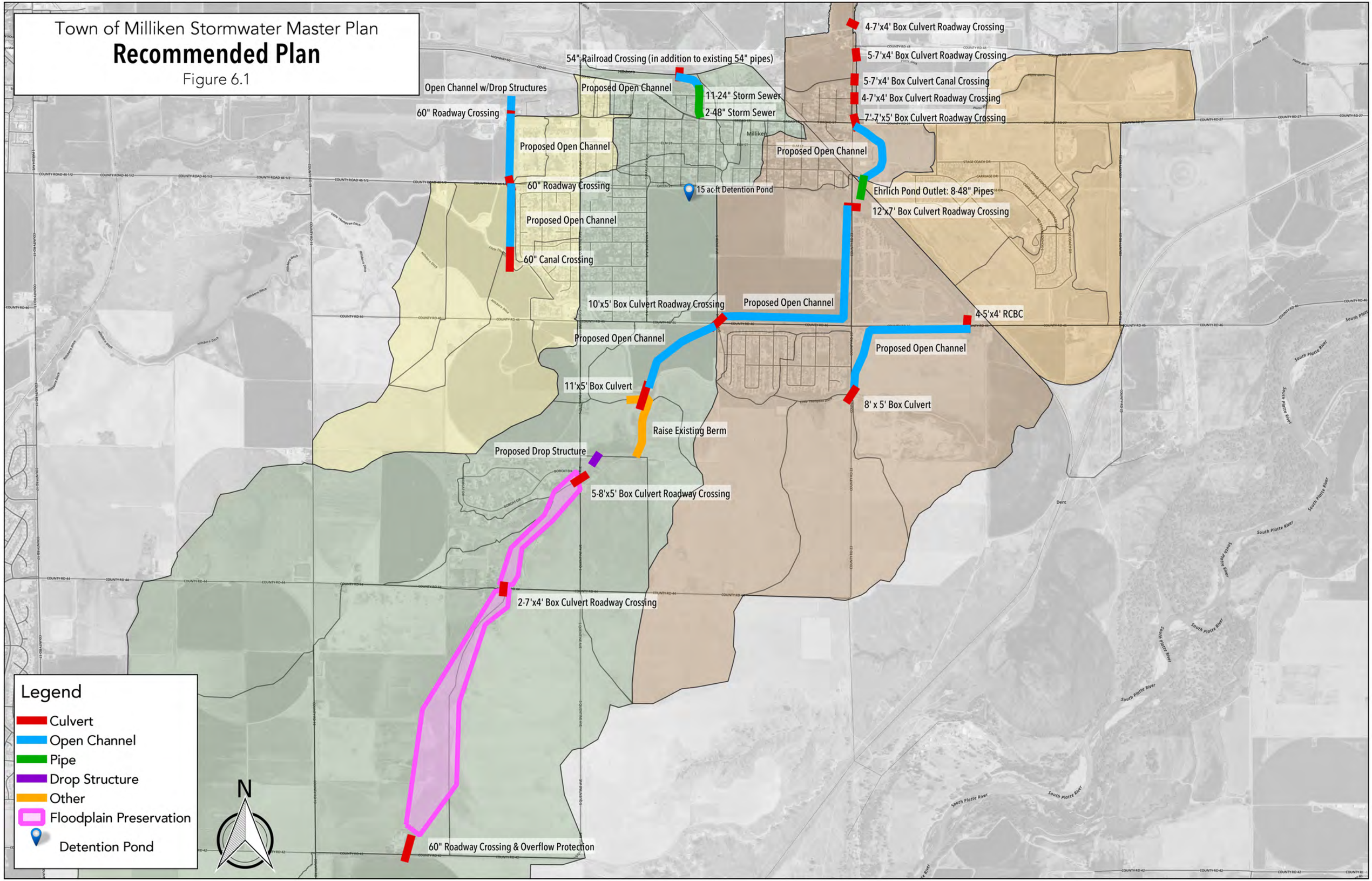
Table 6.1, Recommended Plan Cost Estimates

Alternative	Capital Improvement Cost	ROW/Easements	Engineering (15%)	Legal/Administrative (5%)	Contract Admin/Construction Mgmt (10%)	Contingency (25%)	Total Improvements	Annual Maintenance	50-Year Maintenance
Western Tributary	$ 960,597	$ 10,479	$ 144,090	$ 48,030	$ 96,060	$ 240,149	$ 1,499,405	$ 4,630	$ 231,500
Lola Park Tributary	$ 5,881,977	$ 14,440	$ 882,297	$ 294,099	$ 588,198	$ 1,470,494	$ 9,131,505	$ 10,760	$ 538,000
Eastern Tributary	$ 6,639,765	$ 9,624	$ 995,965	$ 331,988	$ 663,977	$ 1,659,941	$ 10,301,260	$ 3,450	$ 172,500
Total	$ 13,482,339	$ 34,543	$ 2,022,352	$ 674,117	$ 1,348,235	$ 3,370,584	**$ 20,932,170**	$ 18,840	$ 942,000

Town of Milliken Stormwater Master Plan

Recommended Plan

Figure 6.1



SECTION 7.0 REFERENCES

1. Simons, Li & Associates, Inc, *Flood Plain Information, Drainage Plan and Street Improvement Plan at Milliken, Colorado*, October 1982

2. Icon Engineering, Inc.. *Hydrologic Analysis of the Box Elder Creek/Cooper Slough Watershed,* April 2014

3. RMC, July 2000, *Final Drainage Report for Centennial Farms Subdivision*

4. Urban Drainage & Flood Control District, *Urban Storm Drainage Criteria Manual*, April 2008

5. National Oceanic and Atmospheric Administration, *NOAA Atlas 2 Precipitation-Frequency Atlas of the Western United States, Volume III – Colorado*, 1973

6. Urban Drainage and Flood Control District, *UDFCD Position on the NOAA Atlas 14 Precipitation-Frequency Atlas, Volume 8*, September 2013

7. Urban Drainage and Flood Control District, *Colorado Urban Hydrograph Procedure 2005*, computer program, version 1.4.3

8. RMC, July 2000, *Final Drainage Report for the Colony Pointe Subdivision at Milliken, Colorado*

APPENDIX A – HYDROLOGIC ANALYSIS

ICON ENGINEERING, INC.

Table A.1 - Milliken Rainfall Distributions

2-Year		
Point Rainfall (in)	Time (min.)	Depth (in.)
0.97	0	0.019
	5	0.039
	10	0.081
	15	0.155
	20	0.243
	25	0.136
	30	0.061
	35	0.049
	40	0.029
	45	0.029
	50	0.029
	55	0.029
	60	0.029
	65	0.019
	70	0.019
	75	0.019
	80	0.019
	85	0.019
	90	0.019
	95	0.019
	100	0.019
	105	0.019
	110	0.010
	115	0.010
	120	0.000

5-Year		
Point Rainfall (in)	Time (min.)	Depth (in.)
1.33	0	0.027
	5	0.049
	10	0.116
	15	0.203
	20	0.333
	25	0.173
	30	0.077
	35	0.059
	40	0.048
	45	0.048
	50	0.040
	55	0.040
	60	0.040
	65	0.040
	70	0.033
	75	0.029
	80	0.029
	85	0.029
	90	0.029
	95	0.020
	100	0.020
	105	0.020
	110	0.020
	115	0.017
	120	0.000

10-Year		
Point Rainfall (in)	Time (min.)	Depth (in.)
1.6	0	0.032
	5	0.059
	10	0.131
	15	0.240
	20	0.400
	25	0.192
	30	0.090
	35	0.069
	40	0.061
	45	0.051
	50	0.051
	55	0.051
	60	0.051
	65	0.051
	70	0.051
	75	0.040
	80	0.030
	85	0.030
	90	0.030
	95	0.030
	100	0.030
	105	0.030
	110	0.027
	115	0.021
	120	0.000

25-Year		
Point Rainfall (in)	Time (min.)	Depth (in.)
1.95	0	0.025
	5	0.068
	10	0.098
	15	0.156
	20	0.293
	25	0.488
	30	0.234
	35	0.156
	40	0.098
	45	0.098
	50	0.062
	55	0.062
	60	0.062
	65	0.047
	70	0.047
	75	0.035
	80	0.035
	85	0.027
	90	0.027
	95	0.027
	100	0.027
	105	0.027
	110	0.027
	115	0.027
	120	0.000

50-Year		
Point Rainfall (in)	Time (min.)	Depth (in.)
2.3	0	0.030
	5	0.081
	10	0.115
	15	0.184
	20	0.345
	25	0.575
	30	0.276
	35	0.184
	40	0.115
	45	0.115
	50	0.074
	55	0.074
	60	0.074
	65	0.055
	70	0.055
	75	0.041
	80	0.041
	85	0.032
	90	0.032
	95	0.032
	100	0.032
	105	0.032
	110	0.032
	115	0.032
	120	0.000

100-Year		
Point Rainfall (in)	Time (min.)	Depth (in.)
2.56	0	0.026
	5	0.077
	10	0.118
	15	0.205
	20	0.358
	25	0.640
	30	0.358
	35	0.205
	40	0.159
	45	0.128
	50	0.102
	55	0.102
	60	0.102
	65	0.051
	70	0.051
	75	0.031
	80	0.031
	85	0.031
	90	0.031
	95	0.031
	100	0.031
	105	0.031
	110	0.031
	115	0.031
	120	0.000

500-Year		
Point Rainfall (in)	Time (min.)	Depth (in.)
3.4	0	0.034
	5	0.102
	10	0.156
	15	0.272
	20	0.476
	25	0.850
	30	0.476
	35	0.272
	40	0.211
	45	0.170
	50	0.136
	55	0.136
	60	0.136
	65	0.068
	70	0.068
	75	0.041
	80	0.041
	85	0.041
	90	0.041
	95	0.041
	100	0.041
	105	0.041
	110	0.041
	115	0.041
	120	0.000

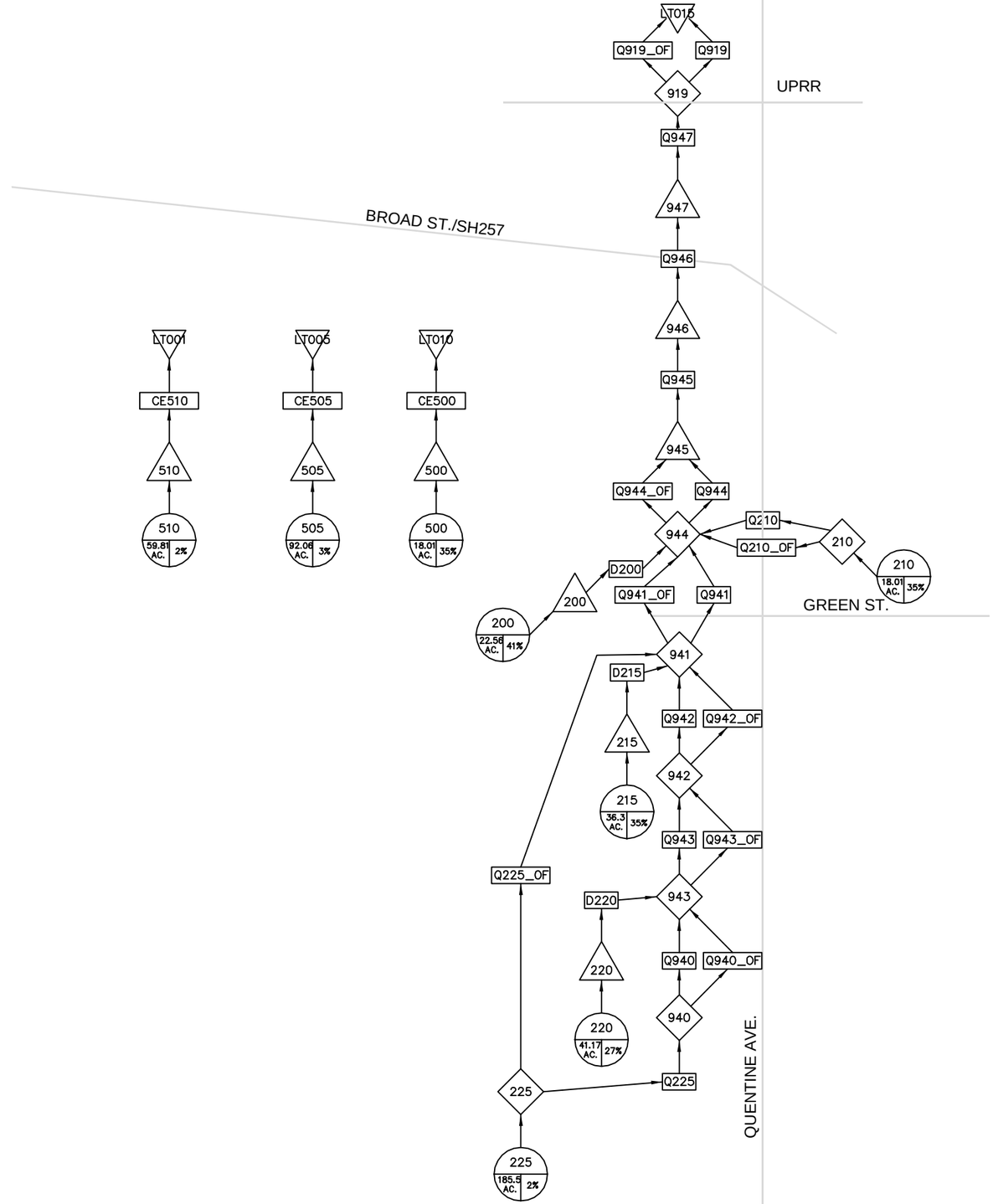
Table A.2 - CUHP Input Parameters

CUHP Input Parameters

Basin ID	Area (Ac)	Length (ft)	Length to Centroid (ft)	Slope (ft/ft)	Existing Percent Imper %	Future Percent Imper %	Maximum Depression Storage (Watershed inches)		Horton's Infiltration Parameters		
							Pervious (in)	Impervious (in)	Initial Rate (in/hr)	Final Rate (in/hr)	Decay Coefficient (1/sec)
001	25.49	2057	431	0.0173	29	66	0.35	0.1	4	0.6	0.0018
005	31.21	1925	843	0.012	43	63	0.35	0.1	4.5	0.6	0.0018
010	6.64	582	295	0.0331	35	36	0.35	0.1	4.1	0.6	0.0018
015	9.7	956	765	0.0152	34	38	0.35	0.1	4.5	0.6	0.0018
020	40.64	2450	1010	0.0117	39	39	0.35	0.1	4.5	0.6	0.0018
025	7.13	789	384	0.0149	59	59	0.35	0.1	4.5	0.6	0.0018
030	15.61	1659	738	0.01	46	46	0.35	0.1	4.5	0.6	0.0018
040	4.81	878	482	0.0087	52	52	0.35	0.1	4.5	0.6	0.0018
045	18.71	1960	911	0.0095	35	35	0.35	0.1	4.5	0.6	0.0018
100	87.26	2882	1762	0.00596	26	38	0.35	0.1	4.4	0.6	0.0018
105	78.64	2936	1696	0.0082	3	4	0.35	0.1	4.5	0.6	0.0018
110	94.31	3500	1867	0.0177	2	42	0.35	0.1	3.8	0.6	0.0018
115	38.93	2198	1142	0.0377	2	44	0.35	0.1	3	0.5	0.0018
120	82.63	2852	1465	0.0227	17	35	0.35	0.1	3	0.5	0.0018
125	464.58	10535	6071	0.018	4	5	0.35	0.1	3	0.5	0.0018
130	79.35	4565	1889	0.0177	10	31	0.35	0.1	3	0.5	0.0018
135	280.41	5625	1657	0.0109	2	32	0.35	0.1	3	0.5	0.0018
140	494.36	6417	5545	0.0156	2	2	0.35	0.1	3	0.5	0.0018
145	376.87	7959	5294	0.0157	2	2	0.35	0.1	3	0.5	0.0018
200	22.56	3285	1726	0.0164	41	41	0.35	0.1	4.5	0.6	0.0018
205	4.98	899	421	0.0346	33	41	0.35	0.1	4.1	0.6	0.0018
206	5.16	950	616	0.0197	35	35	0.35	0.1	4.1	0.6	0.0018
210	18.01	1211	682	0.0078	35	35	0.35	0.1	4.5	0.6	0.0018
215	36.3	2589	2199	0.009	35	35	0.35	0.1	4.5	0.6	0.0018
220	41.17	2712	1495	0.0193	27	39	0.35	0.1	4.3	0.6	0.0018
225	185.49	6981	3689	0.0143	2	26	0.35	0.1	3.2	0.5	0.0018
300	52.45	3871	2178	0.0077	2	4	0.35	0.1	4.3	0.6	0.0018
305	21.53	1074	589	0.0154	37	38	0.35	0.1	4.5	0.6	0.0018
310	51.94	2586	1422	0.0141	70	70	0.35	0.1	4.5	0.6	0.0018
320	35.84	2218	984	0.0068	35	35	0.35	0.1	4.5	0.6	0.0018
325	163	4044	2636	0.0078	3	45	0.35	0.1	4.5	0.6	0.0018
330	93.51	1780	647	0.008	44	45	0.35	0.1	4.5	0.6	0.0018
335	235.94	5117	2521	0.0179	2	49	0.35	0.1	3.9	0.6	0.0018
340	13.11	3546	1836	0.0135	45	45	0.35	0.1	4.2	0.6	0.0018
345	38	2336	1212	0.0164	43	45	0.35	0.1	4.4	0.6	0.0018
350	35.42	2069	1564	0.0119	44	45	0.35	0.1	3.8	0.6	0.0018
355	268.22	7093	3591	0.0208	2	45	0.35	0.1	3	0.5	0.0018
360	165.5	3931	2495	0.0192	2	31	0.35	0.1	3	0.5	0.0018
405	203.24	4044	1882	0.0216	45	45	0.35	0.1	4.5	0.6	0.0018
415	85.59	2144	982	0.0157	44	46	0.35	0.1	4.2	0.6	0.0018

CUHP Input Parameters

Basin ID	Area (Ac)	Length (ft)	Length to Centroid (ft)	Slope (ft/ft)	Existing Percent Imper %	Future Percent Imper %	Maximum Depression Storage (Watershed inches)		Horton's Infiltration Parameters		
							Pervious (in)	Impervious (in)	Initial Rate (in/hr)	Final Rate (in/hr)	Decay Coefficient (1/sec)
500	18.01	1268	834	0.0117	35	35	0.35	0.1	4.5	0.6	0.0018
505	92.06	4882	2272	0.0215	3	37	0.35	0.1	3.9	0.6	0.0018
510	59.81	4214	2354	0.023	2	5	0.35	0.1	3.3	0.5	0.0018
600	133.57	6156	4047	0.0311	27	27	0.35	0.1	3.6	0.5	0.0018
625	117.35	4028	2783	0.0434	10	10	0.35	0.1	4.2	0.6	0.0018
630	110.51	2764	1593	0.0416	12	24	0.35	0.1	4.5	0.6	0.0018
635	302.02	5451	3611	0.0393	3	8	0.35	0.1	3.7	0.5	0.0018
640	24.7	1760	710	0.039	2	26	0.35	0.1	4.5	0.6	0.0018
650	51.31	1988	919	0.0643	2	2	0.35	0.1	3.7	0.5	0.0018
655	35.81	1962	1152	0.0603	2	2	0.35	0.1	3.3	0.5	0.0018
660	68.03	3460	1606	0.0413	26	26	0.35	0.1	4.5	0.6	0.0018
665	135.99	4948	2674	0.034	2	6	0.35	0.1	4.4	0.6	0.0018
675	1113.64	12474	7728	0.0374	2	2	0.35	0.1	4.3	0.6	0.0018
803	203.07	9119	5495	0.0148	2	14	0.35	0.1	4.5	0.6	0.0018
804	119.06	2151	1374	0.0469	2	35	0.35	0.1	4.5	0.6	0.0018
805	154.34	7531	4363	0.0199	2	26	0.35	0.1	4.5	0.6	0.0018
806	166.72	6880	3762	0.0255	2	7	0.35	0.1	4.5	0.6	0.0018
807	158.24	7996	3883	0.0296	2	2	0.35	0.1	4.5	0.6	0.0018
808	395.49	9274	3947	0.0305	2	2	0.35	0.1	4.5	0.6	0.0018
809	641.58	11413	5370	0.0337	2	2	0.35	0.1	4.5	0.6	0.0018
810	846.15	13703	7222	0.034	2	2	0.35	0.1	4.5	0.6	0.0018
811	130.13	3851	2020	0.039	2	2	0.35	0.1	3.6	0.5	0.0018
812	153.78	7619	3738	0.0249	2	2	0.35	0.1	4.5	0.6	0.0018
813	485.98	12594	6329	0.0311	2	2	0.35	0.1	4.2	0.6	0.0018
814	150.07	4068	1927	0.0377	2	2	0.35	0.1	3.9	0.6	0.0018
815	632.39	11064	6896	0.0308	2	2	0.35	0.1	4	0.6	0.0018
818	578.48	13394	6438	0.0327	2	4	0.35	0.1	4.2	0.6	0.0018
821	169.02	4973	2548	0.0311	2	7	0.35	0.1	4.3	0.6	0.0018
824	220.52	8055	4275	0.0312	2	2	0.35	0.1	4.3	0.6	0.0018
825	135.03	5492	2662	0.0388	4	7	0.35	0.1	4.3	0.6	0.0018
834	56.83	3286	2080	0.0068	42	43	0.35	0.1	4	0.6	0.0018
835	85.55	2603	732	0.0175	22	76	0.35	0.1	4.3	0.6	0.0018
836	46.66	2530	1221	0.0083	2	90	0.35	0.1	3.3	0.5	0.0018
837	16.08	1101	541	0.0183	25	90	0.35	0.1	4.5	0.6	0.0018
838	22.86	1165	406	0.0288	59	84	0.35	0.1	4.5	0.6	0.0018
101	14.82	1838	1186	0.02173	26	38	0.35	0.1	4.4	0.6	0.0018
102	17.25	2270	1221	0.01999	26	38	0.35	0.1	4.4	0.6	0.0018
116	80.48	2896	1475	0.0233	2	44	0.35	0.1	3	0.5	0.0018
117	78.08	2838	1001	0.0326	2	44	0.35	0.1	3	0.5	0.0018
136	329.8	5957	3860	0.02024	2	2	0.35	0.1	3	0.5	0.0018
137	302.58	4713	3868	0.033023	2	32	0.35	0.1	3	0.5	0.0018



LEGEND

- 5 / 2.5 AC. / 56% — SUBWATERSHED DESIGNATION; PERCENT IMPERVIOUS; AREA (ACRES)
- 128 — DESIGN POINT
- 195 — ROUTING ELEMENT
- IN — INFLOW HYDROGRAPH
- KP — DETENTION POND
- 901 — DIVIDER
- BT055 — OUTFALL

NORTH

No.	DATE	REVISIONS	APPR.

14-004-MIL

PLAN
DRAWN TGM
DESIGNED TGM
CHECKED TGM

UTILITIES
RESEARCHED
DRAWN
CHECKED

ICON ENGINEERING, INC.
8100 South Akron Street, Suite 300, Centennial, CO 80112
Phone (303) 221-0602 / Fax (303) 221-1019
www.iconeng.com

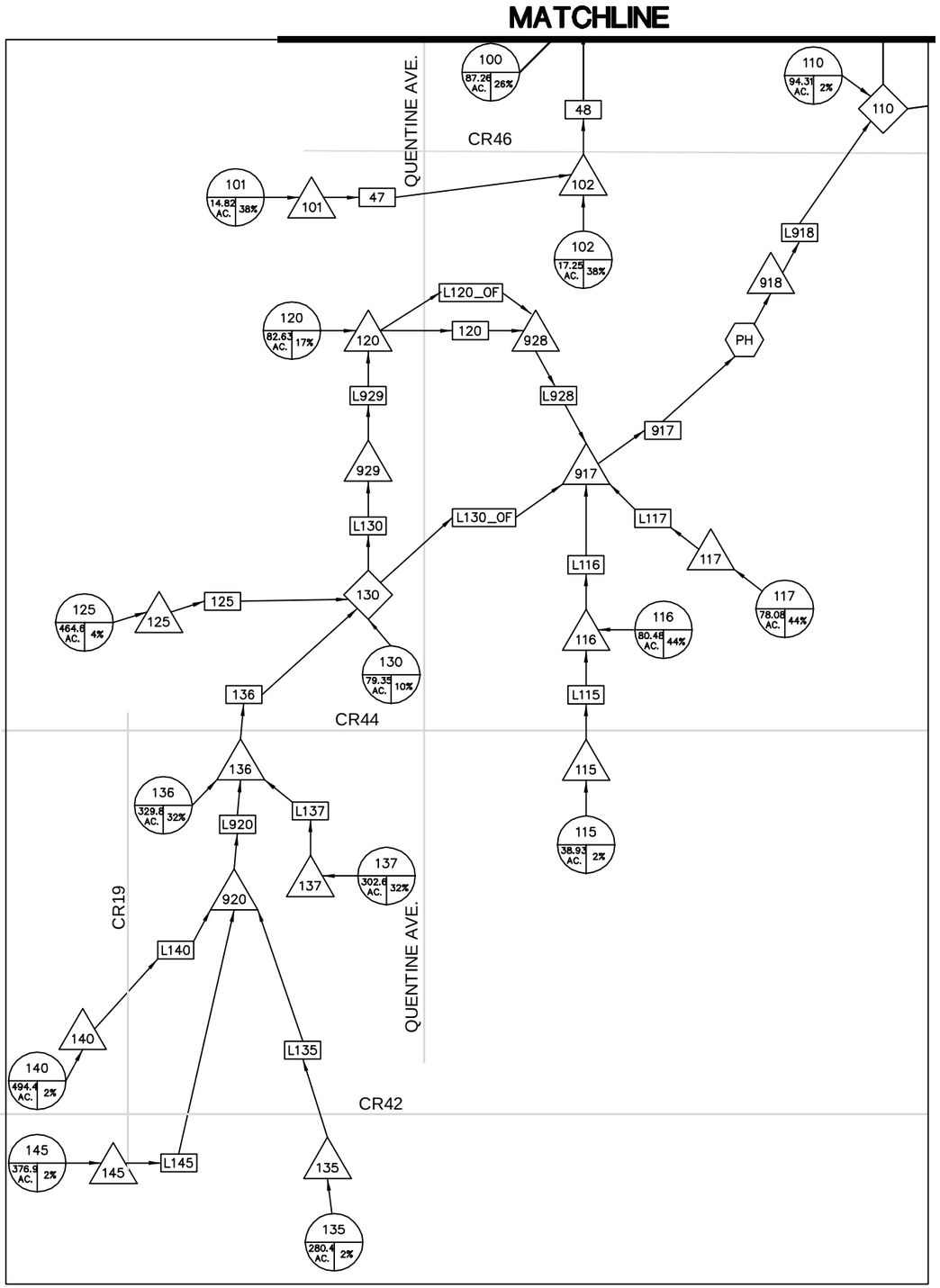
MILLIKEN DRAINAGE MASTER PLAN

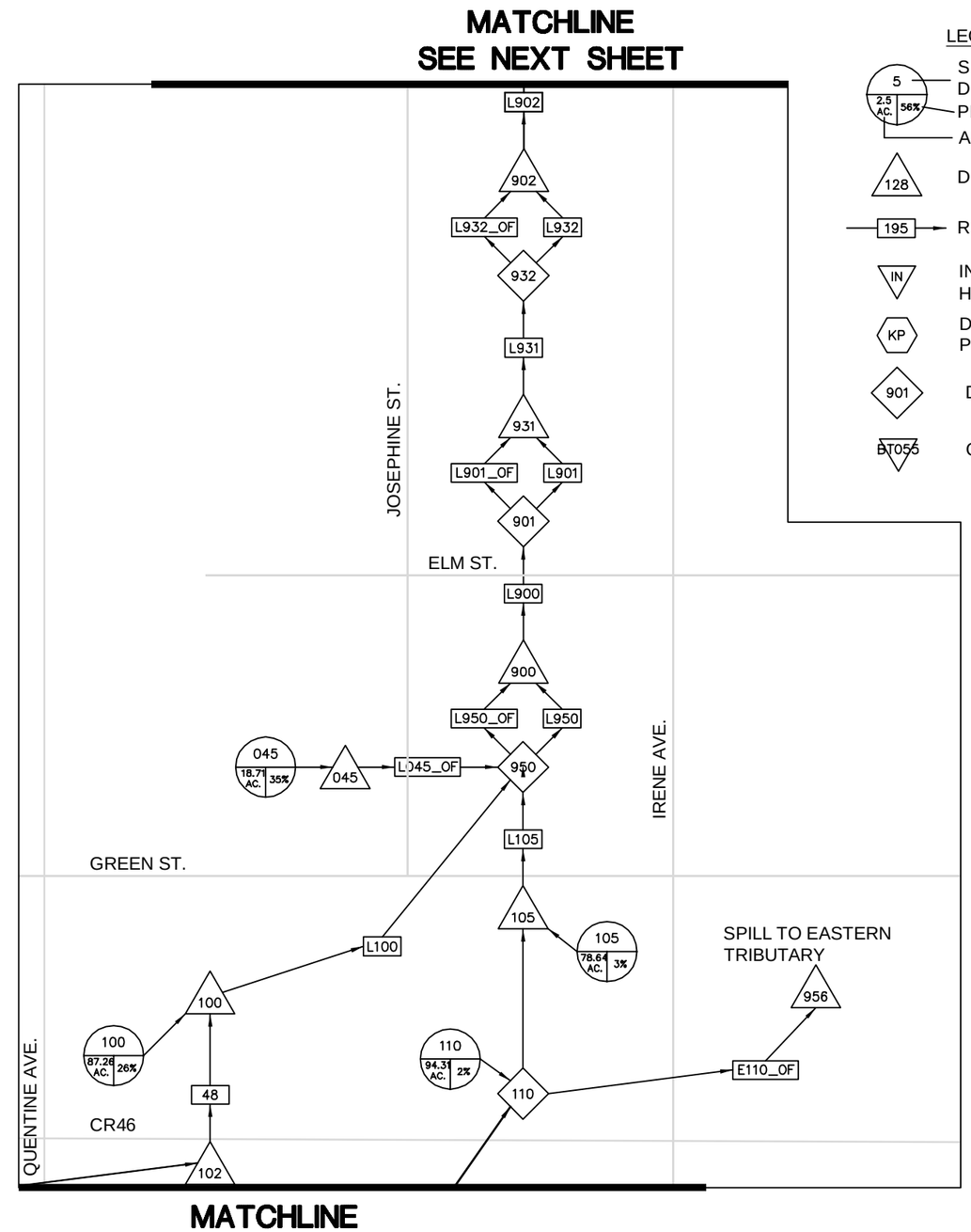
SWMM ROUTING MAP

WESTERN TRIBUTARY

DATE
SEPT 2014

FIGURE
A-1





MATCHLINE

LEGEND

- SUBWATERSHED DESIGNATION
- PERCENT IMPERVIOUS
- AREA (ACRES)
- DESIGN POINT
- ROUTING ELEMENT
- INFLOW HYDROGRAPH
- DETENTION POND
- DIVIDER
- OUTFALL

NORTH

No.	DATE	REVISIONS	APPR.

14-004-MIL

PLAN
DRAWN TGM
DESIGNED TGM
CHECKED TGM

UTILITIES
RESEARCHED
DRAWN
CHECKED

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WWW.ICONENG.COM

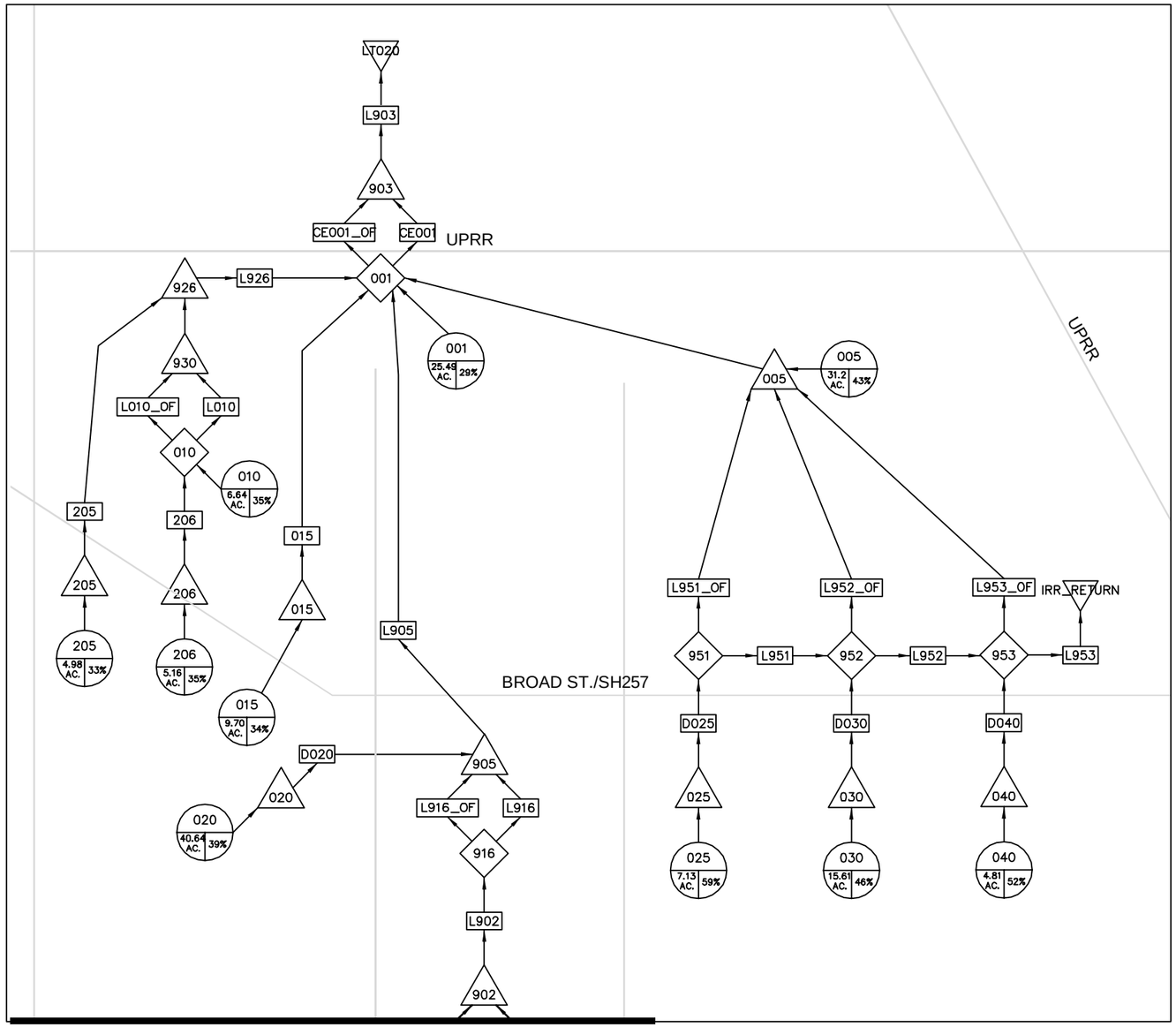
MILLIKEN DRAINAGE MASTER PLAN

SWMM ROUTING MAP

LOLA PARK TRIBUTARY 1

DATE
SEPT 2014

FIGURE
A-2



MATCHLINE
SEE PREVIOUS SHEET

LEGEND

- 5 / 2.5 AC. / 56% — SUBWATERSHED DESIGNATION; PERCENT IMPERVIOUS; AREA (ACRES)
- 128 — DESIGN POINT
- 195 — ROUTING ELEMENT
- IN — INFLOW HYDROGRAPH
- KP — DETENTION POND
- 901 — DIVIDER
- BT055 — OUTFALL
- NORTH

No.	DATE	REVISIONS	APPR.

14-004-MIL

PLAN: DRAWN TGM; DESIGNED TGM; CHECKED TGM

UTILITIES: RESEARCHED; DRAWN; CHECKED

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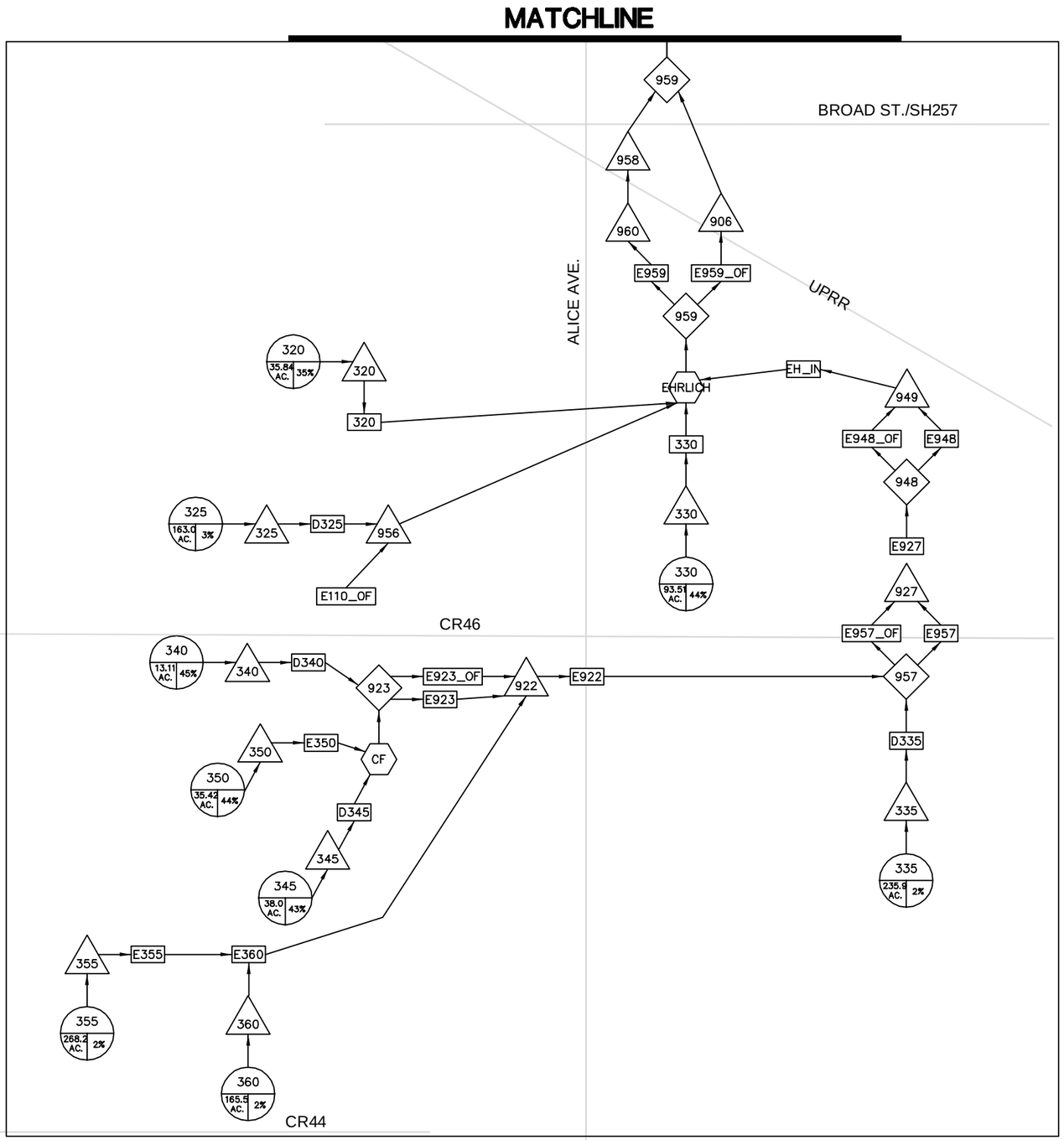
MILLIKEN DRAINAGE MASTER PLAN

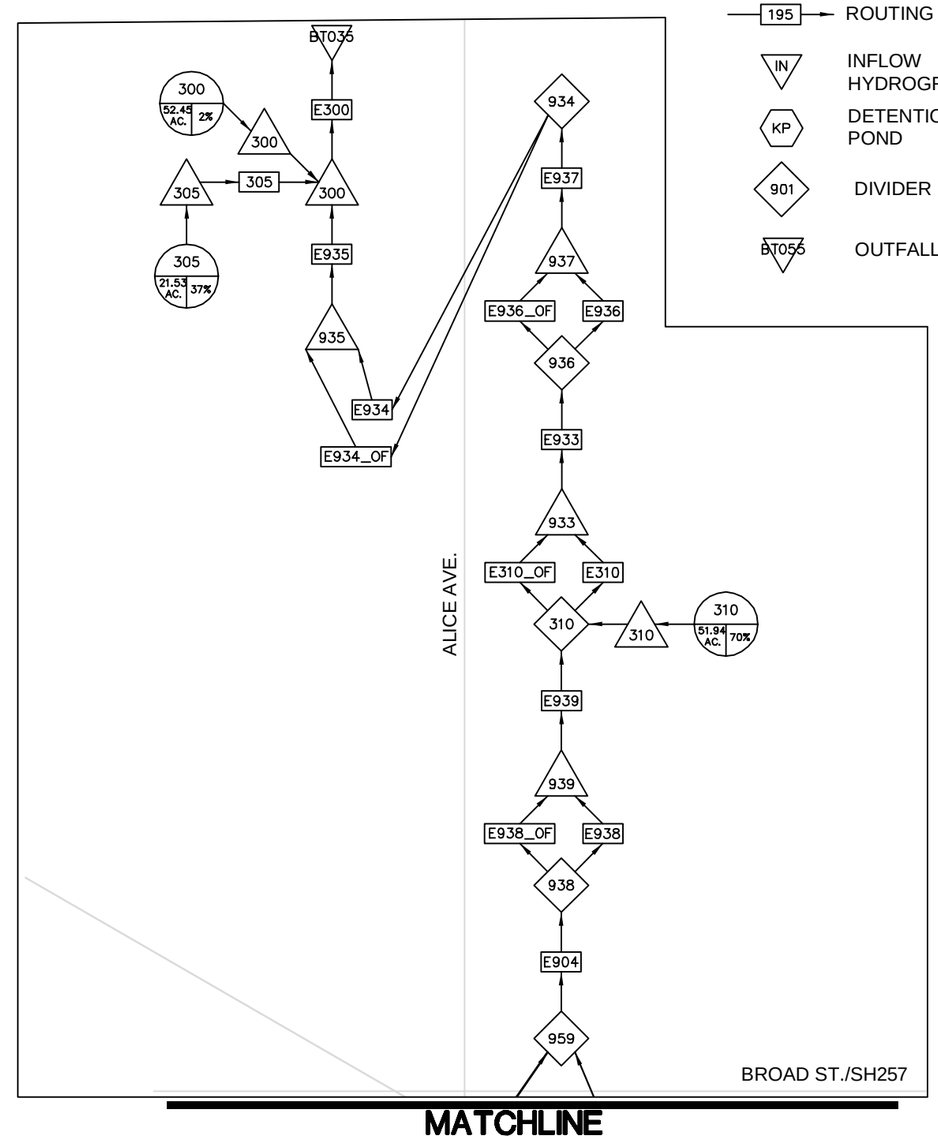
SWMM ROUTING MAP

LOLA PARK TRIBUTARY 2

DATE: **SEPT 2014**

FIGURE: **A-3**





LEGEND

- 5 / 2.5 AC. / 56% — SUBWATERSHED DESIGNATION; PERCENT IMPERVIOUS; AREA (ACRES)
- 128 — DESIGN POINT
- 195 — ROUTING ELEMENT
- IN — INFLOW HYDROGRAPH
- KP — DETENTION POND
- 901 — DIVIDER
- BT055 — OUTFALL

NORTH

No.	DATE	REVISIONS	APPR.

14-004-MIL

PLAN
DRAWN TGM
DESIGNED TGM
CHECKED TGM

UTILITIES
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DRAWN
CHECKED

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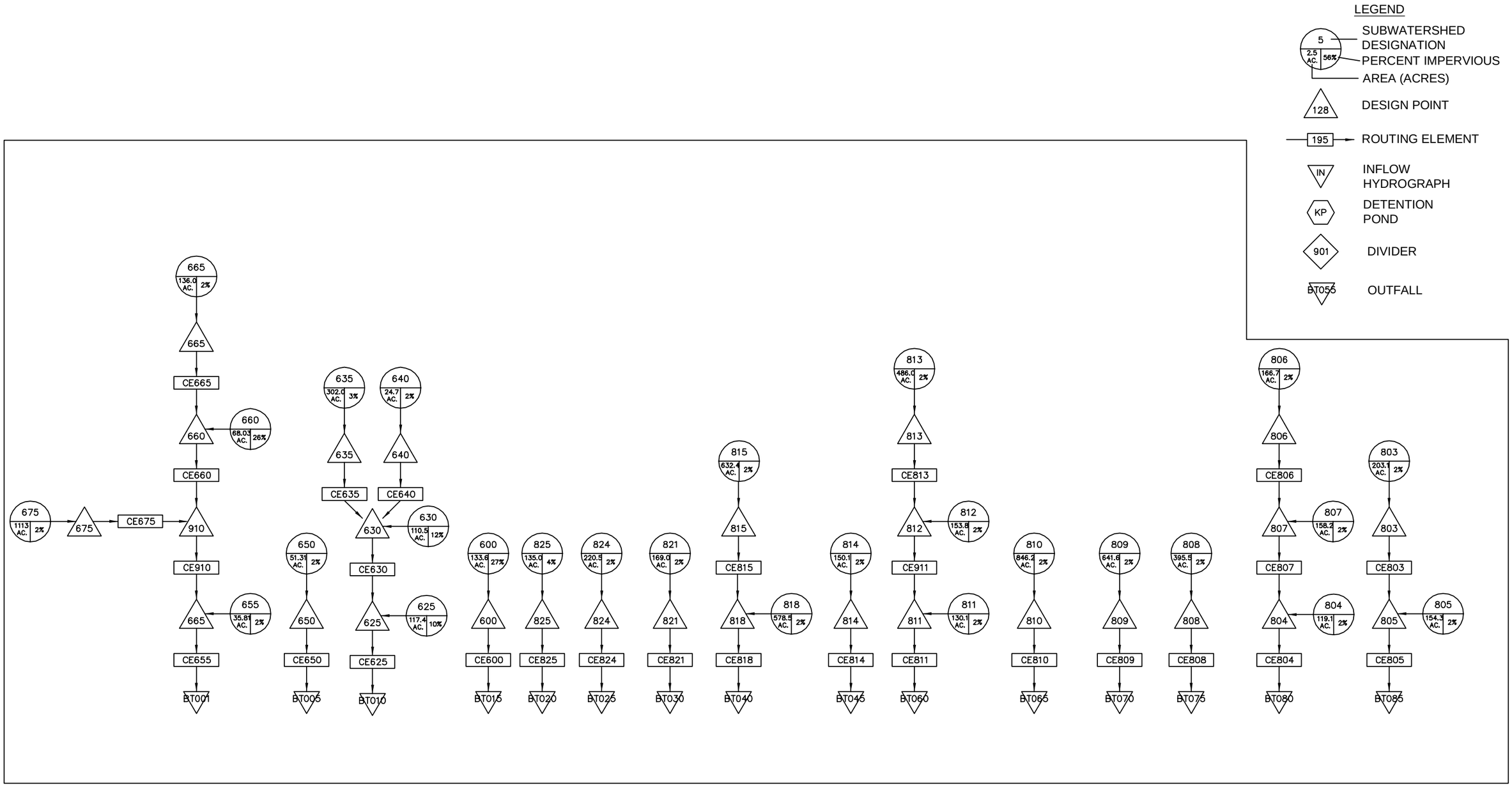
MILLIKEN DRAINAGE MASTER PLAN

SWMM ROUTING MAP

EASTERN TRIBUTARY

DATE
SEPT 2014

FIGURE
A-5



No.	DATE	REVISIONS	APPR.

14-004-MIL

PLAN	UTILITIES
DRAWN TGM	RESEARCHED
DESIGNED TGM	DRAWN
CHECKED TGM	CHECKED

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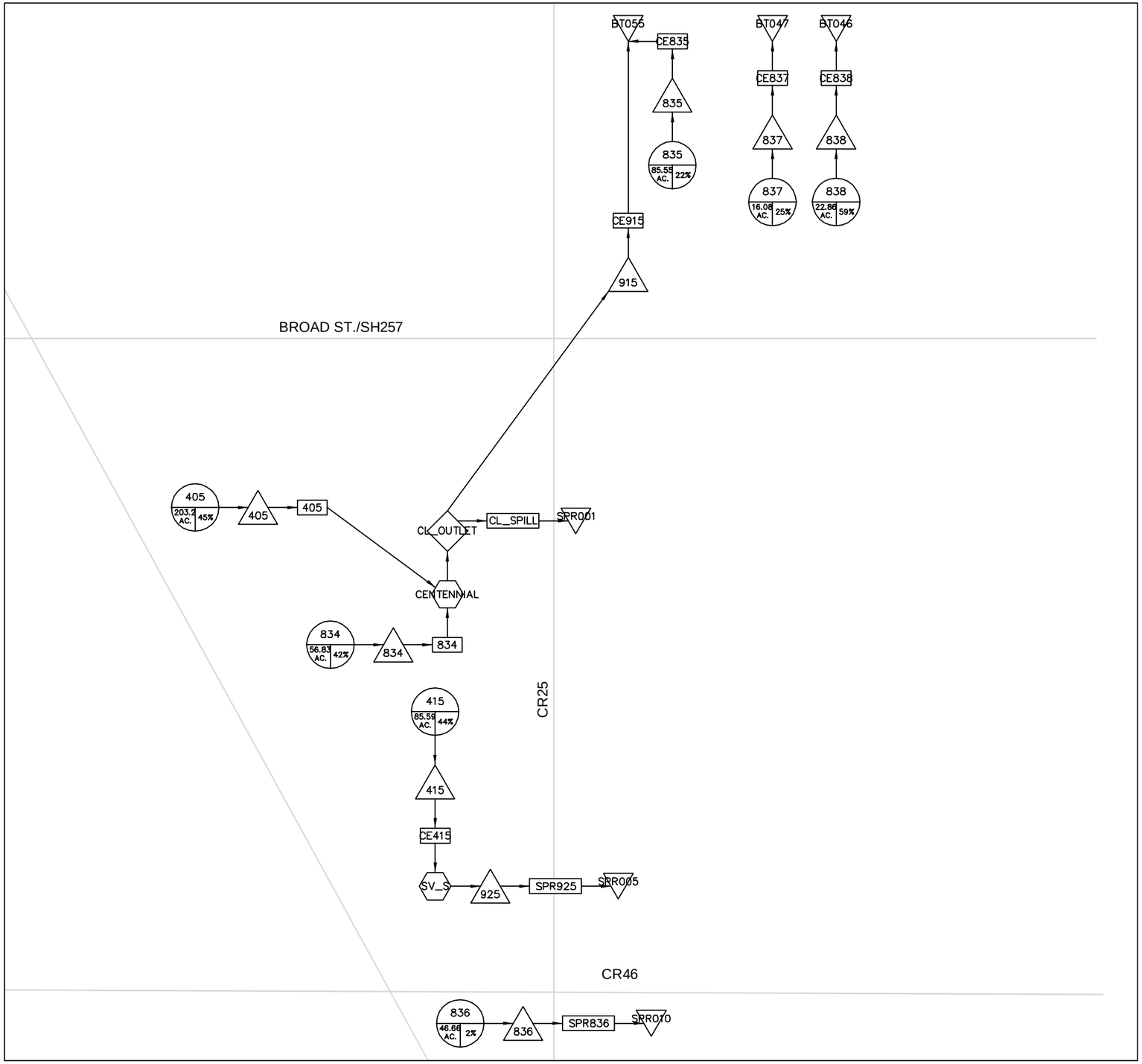
MILLIKEN DRAINAGE MASTER PLAN

SWMM ROUTING MAP

NORTHERN TRIBUTARY

DATE **SEPT 2014**

FIGURE **A-4**



LEGEND

- 5 / 2.5 AC. / 56% — SUBWATERSHED DESIGNATION; PERCENT IMPERVIOUS; AREA (ACRES)
- 128 — DESIGN POINT
- 195 — ROUTING ELEMENT
- IN — INFLOW HYDROGRAPH
- KP — DETENTION POND
- 901 — DIVIDER
- BT055 — OUTFALL

NORTH

No.	DATE	REVISIONS	APPR.

14-004-MIL

PLAN
DRAWN TGM
DESIGNED TGM
CHECKED TGM

UTILITIES
RESEARCHED
DRAWN
CHECKED

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MILLIKEN DRAINAGE MASTER PLAN

SWMM ROUTING MAP

BIG THOMPSON TRIBUTARY

DATE
SEPT 2014

FIGURE
A-6

Table A.3 - Detention Facilities

Pheasant Hills

Elevation	Surface Area	Stage	Storage
ft	ft^2	ft	Ac-ft
4782	190872	0	0.0
4783	310653	1	5.7
4784	384215	2	13.7
4785	429812	3	23.0
4786	464932	4	33.3
4787	500310	5	44.3
4788	531727	6	56.2
4789	563330	7	68.8
4790	587945	8	82.0
4791	610261	9	95.7
4792	632103	10	110.0
4792.5	640000**	10.5	117.3
4794	650000**	12	139.5
4797	700000**	15	186.0

** - Area estimated

Pheasant Hills Weir Characteristics

Weir Elevation:	4792.5	ft
Weir Length:	60	ft
Weir Coefficient:	3.0	

Centennial Farms

Elevation	Surface Area	Stage	Storage	Discharge
ft	ft^2	ft	Ac-ft	cfs
4760.0	14,864	0.0	0.0	0
4761.0	40,806	1.0	0.6	3.5
4762.0	64,983	2.0	1.8	6
4763.0	91,078	3.0	3.6	6
4764.0	102,821	4.0	5.8	6
4765.0	114,334	5.0	8.3	150

Settler's Village South

Elevation	Surface Area	Stage	Storage	Discharge
ft	ft^2	ft	Ac-ft	cfs
4731.0	349,225	0.0	0.0	0
4732.0	354,297	1.0	8.1	3.5
4733.0	359,772	2.0	16.3	6
4734.0	366,100	3.0	24.6	6
4735.0	372,564	4.0	33.1	6
4736.0	378,926	5.0	41.7	6
4737.0	386,139	6.0	50.5	6
4738.0	397,383	7.0	59.5	6

Centennial Lake

Elevation	Surface Area	Stage	Storage	Discharge
ft	ft^2	ft	Ac-ft	cfs
4725.0	353,816	0.0	0.0	0
4726.0	362,165	1.0	8.2	3.5
4727.0	374,105	2.0	16.7	6
4728.0	387,620	3.0	25.4	6
4729.0	400,299	4.0	34.5	6
4730.0	411,591	5.0	43.8	6
4731.0	425,076	6.0	53.4	6
4732.0	439,856	7.0	63.3	6
4733.0	454,631	8.0	73.6	6
4734.0	469,025	9.0	84.2	6
4735.0	483,952	10.0	95.1	6
4736.0	500,631	11.0	106.4	6
4737.0	500,631**	12.0	117.9	99.2

** - Vertically extended contour

Ehrlich Lake

Elevation	urface Are	Stage	Storage	Discharge
ft	ft^2	ft	Ac-ft	cfs
4740.0	347,686	0.0	0.0	0
4741.0	382,480	1.0	8.4	0
4742.0	402,230	2.0	17.4	0
4743.0	418,517	3.0	26.8	0
4744.0	433,768	4.0	36.6	0
4744.3	--	4.3	--	0
4745.0	449,345	5.0	46.7	2
4746.0	466,119	6.0	57.2	16
4747.0	484,702	7.0	68.1	36
4748.0	506,102	8.0	79.5	51
4749.0	530,262	9.0	91.4	74
4750.0	657,662	10.0	105.0	72
4751.0	834,950	11.0	122.1	107
4751.38	--	11.4	--	140
4752.0	957,935	12.0	142.7	1467.4
4753	957,935**	13	164.7	2812.5

** - Vertically extended contour

Table A.4 – Western Tributary Existing Conditions Peak flows and Volumes

Design Point	Existing Conditions Peak Flows (cfs)							Existing Conditions Runoff Volumes (ac-ft)						
	Q_2	Q_5	Q_{10}	Q_{25}	Q_{50}	Q_{100}	Q_{500}	V_2	V_5	V_{10}	V_{25}	V_{50}	V_{100}	V_{500}
225	2.3	29.32	50.56	99.36	134.37	169.88	257.39	0.31	3.85	7.35	13.74	18.96	24.20	37.33
940	1.13	14.62	25.24	49.53	67.01	84.88	128.43	0.16	1.93	3.68	6.87	9.49	12.10	18.67
943	8.02	27.29	42.36	79.48	107.56	136.63	206.85	0.89	3.43	5.91	10.58	14.37	18.10	27.64
220	8.02	17.41	25.33	44.62	58.32	70.75	104.15	0.73	1.50	2.21	3.66	4.83	5.94	8.90
942	7.99	27.28	42.54	79.4	107.42	136.56	206.62	0.89	3.42	5.91	10.61	14.40	18.13	27.67
215	8.37	16.01	22.54	37.92	48.88	59.15	85.94	0.89	1.61	2.26	3.53	4.58	5.54	8.17
941	16.34	52.81	81.98	156.55	211.09	268.2	403.22	1.94	6.98	11.87	21.04	28.50	35.91	54.61
200	6.97	12.45	17.02	27.43	35.07	41.77	60.22	0.68	1.15	1.56	2.35	3.00	3.59	5.23
210	6.31	12.27	17.04	27.95	36.01	42.99	62.12	0.44	0.80	1.12	1.75	2.27	2.74	4.04
944	27.26	67.76	103.91	183.22	239.76	305.11	468.05	3.05	8.90	14.52	25.39	34.06	42.60	64.39
945	27.25	67.76	103.86	183.38	239.75	331.87	466.89	3.05	8.90	14.52	25.39	34.06	42.68	64.57
946	27.14	67.73	103.6	184.3	239.69	313.44	466.51	3.05	8.91	14.52	25.40	34.06	42.68	64.57
947	27.14	67.72	103.58	184.17	239.69	312.49	427.82	3.05	8.91	14.52	25.40	34.06	42.68	63.15
919	27.14	67.72	103.58	184.16	239.69	312.44	427.82	3.05	8.91	14.52	25.40	34.06	42.68	63.15
LT015	27.13	67.72	103.58	184.13	239.69	312.36	427.81	3.05	8.91	14.52	25.39	34.06	42.68	63.21

Table A.5 – Lola Park Tributary Existing Conditions Peak flows and Volumes

Design Point	Existing Conditions Peak Flows (cfs)							Existing Conditions Runoff Volumes (ac-ft)						
	Q_2	Q_5	Q_{10}	Q_{25}	Q_{50}	Q_{100}	Q_{500}	V_2	V_5	V_{10}	V_{25}	V_{50}	V_{100}	V_{500}
135	7.04	71.77	119.09	223.48	301.22	371.76	558.93	0.60	6.07	11.35	20.91	28.91	36.82	56.66
140	8.12	82.88	140.83	271.2	367.47	465.15	702.4	1.06	10.70	20.01	36.86	50.96	64.92	99.91
145	5.56	56.27	96.56	186.52	253.31	321.06	486.43	0.81	8.15	15.25	28.09	38.84	49.47	76.14
920	14.09	170.17	305.1	603.3	828.47	1060.82	1621.13	2.67	25.51	47.35	86.83	119.78	152.34	233.98
136	17.46	238.46	449.84	901.45	1258.03	1626.64	2524.52	4.61	41.31	75.68	137.68	189.23	240.04	367.38
137	7.32	74.1	123.26	234.31	314.24	390.13	584.06	0.65	6.54	12.24	22.55	31.17	39.71	61.10
115	1.15	11.7	19.17	35.53	47.73	58.56	87.87	0.08	0.84	1.57	2.90	4.01	5.11	7.86
116	2.65	32.12	54.38	103.96	140.51	173.87	262.03	0.26	2.61	4.86	8.94	12.35	15.72	24.17
117	2.73	28.2	45.52	84.02	112.29	138.31	206.4	0.17	1.69	3.16	5.82	8.06	10.26	15.79
125	9.21	64.62	109.65	207.99	281.99	357.62	541.31	1.56	10.81	19.66	35.47	48.79	61.84	94.82
130	21.83	293.01	557	1112.63	1557.44	2014.06	3134.43	6.84	54.73	99.58	180.20	247.44	313.54	479.63
120	22.24	49.68	67.14	106.08	134.72	161.07	230.65	6.43	10.13	12.21	15.20	17.76	20.12	26.25
917	24.44	329.25	628.21	1254.01	1759.32	2276.86	3217.68	8.41	62.42	112.85	203.27	278.74	352.79	524.32
918	0	0	0	408.61	845.95	1315.02	1718.27	0.00	0.00	0.00	85.70	161.14	235.17	363.83
110	1.05	15.91	30.5	408.64	855.21	1332.76	1773.43	0.10	1.34	2.69	92.08	170.23	247.06	382.57
100	16.07	36.3	54.85	102.65	136.44	168.83	253.9	2.10	4.30	6.35	10.61	14.01	17.22	25.80
101	2.4	5.26	7.76	13.81	18.14	22.01	32.61	0.25	0.52	0.77	1.30	1.72	2.12	3.18
102	5.03	11.03	16.27	29.02	38.1	46.47	68.63	0.55	1.13	1.68	2.81	3.73	4.58	6.89
105	1.58	23.9	47.95	102.92	121.02	138.6	183.24	0.22	2.44	4.87	39.62	45.20	48.61	55.35
45	5.24	10.03	14.15	23.36	30.17	36.28	52.55	0.46	0.83	1.17	1.82	2.36	2.86	4.21
950	21.07	66.87	112.76	224.09	281.82	337.19	481.62	2.80	7.59	12.41	52.07	61.60	68.70	85.38
900	21.07	66.87	112.76	224.08	281.79	359.33	481.59	2.80	7.58	12.40	52.06	61.59	69.27	85.43
901	21.06	66.86	112.74	224.04	281.75	359.27	481.54	2.80	7.59	12.40	52.05	61.59	69.27	85.42
931	21.06	66.86	112.74	224.04	281.75	396.31	481.53	2.80	7.59	12.40	52.05	61.59	70.11	85.48
932	21.06	66.85	112.72	224.01	281.72	396.27	481.49	2.80	7.58	12.40	52.05	61.58	70.11	85.47
902	21.06	66.85	112.72	223.94	281.66	396.19	481.42	2.80	7.59	12.40	52.06	61.59	70.12	85.49
916	31.61	84.23	137.49	268.88	341.32	466.73	588.3	3.94	9.56	15.12	56.19	66.90	76.49	94.81
20	17.01	31.54	43.1	68.75	87.95	104.71	150.28	1.15	1.98	2.72	4.13	5.31	6.37	9.32
905	31.61	84.23	137.49	268.88	341.32	494.45	588.29	3.94	9.56	15.12	56.19	66.90	76.68	94.86
15	3.06	6.03	8.45	13.98	18.08	21.58	31.33	0.23	0.42	0.59	0.93	1.21	1.47	2.17
205	1.68	3.42	4.83	7.84	10.13	12.06	17.65	0.11	0.21	0.30	0.47	0.62	0.75	1.11
206	1.59	3.13	4.36	7.12	9.18	10.92	15.86	0.13	0.23	0.33	0.50	0.65	0.79	1.17
10	4.38	8.83	12.42	19.95	25.83	30.95	45.22	0.29	0.53	0.74	1.14	1.48	1.79	2.64
930	4.38	8.82	12.76	19.95	25.83	30.95	45.21	0.29	0.53	0.74	1.14	1.48	1.79	2.65
926	6.05	12.19	17.5	27.75	35.92	42.98	62.77	0.40	0.74	1.04	1.62	2.10	2.54	3.75
25	7.07	11.21	14.34	20.01	24.84	29.32	40.68	0.32	0.49	0.64	0.88	1.09	1.27	1.80
951	7.07	11.21	14.34	20.01	24.84	29.32	40.68	0.32	0.49	0.64	0.88	1.09	1.27	1.80
30	8.06	13.93	18.42	28.3	35.69	42.26	59.87	0.53	0.87	1.17	1.70	2.16	2.56	3.70
952	14.91	20.39	24.88	34.76	42.14	48.71	66.32	0.85	1.30	1.68	2.26	2.77	3.19	4.42
40	2.92	4.79	6.4	9.42	11.9	13.83	19.61	0.19	0.30	0.39	0.56	0.70	0.82	1.17
953	4.61	6.48	8.09	11.1	13.58	15.51	21.3	0.48	0.60	0.71	0.87	1.02	1.14	1.51
5	27.42	49.76	68.35	107.77	138.23	164.51	236.94	1.57	2.78	3.85	5.85	7.52	9.04	13.28
IRR_RETURN	4.52	5.23	5.23	5.23	5.23	5.23	5.23	0.48	0.58	0.64	0.66	0.69	0.70	0.76
1	66.99	142.88	218.74	407.01	532.76	720.05	928.39	6.68	14.54	22.10	66.95	80.83	93.50	119.67

Table A.6 – Eastern Tributary Existing Conditions Peak Flows and Volumes

Design Point	Existing Conditions Peak Flows (cfs)							Existing Conditions Runoff Volumes (ac-ft)						
	Q_2	Q_5	Q_{10}	Q_{25}	Q_{50}	Q_{100}	Q_{500}	V_2	V_5	V_{10}	V_{25}	V_{50}	V_{100}	V_{500}
355	5	50.9	85.67	164.48	222.2	277.58	419	0.58	5.80	10.85	20.00	27.64	35.21	54.19
360	7.24	83.72	143.59	279.55	379.35	477.77	723.04	0.95	9.44	17.63	32.43	44.80	57.04	87.75
350	17.01	30.47	41.01	62.74	79.54	93.78	133.72	1.16	1.95	2.63	3.85	4.88	5.80	8.42
345	18.83	33.89	45.26	70.28	89.03	105.77	150.37	1.20	2.01	2.71	4.02	5.12	6.10	8.86
340	3.73	6.44	8.64	13.77	17.45	20.75	29.77	0.44	0.73	0.98	1.43	1.81	2.15	3.12
922	15.6	94.06	155.76	296.11	399.34	501.36	897.97	3.77	14.20	24.03	41.83	56.72	71.28	108.15
335	2.57	38.26	73.8	161.79	221.22	279.06	427.11	0.23	3.30	6.62	15.26	21.53	28.14	44.70
957	16.58	117.35	205.63	423.95	582.45	742.62	1268.62	4.04	17.54	30.72	57.17	78.33	99.49	152.93
927	16.58	117.35	205.62	423.94	582.44	742.61	1207.85	4.04	17.54	30.76	57.19	78.35	99.51	152.18
948	15.9	112.35	199.32	414.99	572.29	733.46	1213.1	4.10	17.71	30.98	57.54	78.73	99.86	152.58
949	15.9	112.34	199.24	414.89	572.2	733.35	1212.81	4.10	17.70	31.01	57.56	78.76	99.89	152.61
330	71.06	125.26	169.9	253.42	322.84	383.83	541.18	3.00	4.99	6.73	9.94	12.64	15.05	21.84
325	2.23	21.29	41.65	96.28	132.59	167.57	257.35	0.24	2.18	4.39	10.44	14.79	19.35	30.65
956	2.23	21.29	41.65	353.77	810.13	1297.28	1788.37	0.24	2.18	4.39	69.26	148.85	228.89	373.62
320	11.04	21.33	30.02	49.27	63.87	76.03	110.71	0.88	1.59	2.23	3.47	4.51	5.46	8.05
EHRLICH	80.35	148.23	263.92	543.66	967.65	1549.46	2411.97	8.21	26.45	44.36	140.23	244.76	349.28	556.13
959	0	0	1.15	96.03	707.17	1360.53	2125.69	0.00	0.00	1.49	86.19	187.14	290.95	497.41
960	0	0	1.15	55.73	55.73	55.71	55.69	0.00	0.00	1.49	67.34	79.70	81.69	83.84
958	0	0	1.15	56.9	56.75	57	56.62	0.00	0.00	1.49	67.32	79.67	81.66	83.81
906	0	0	0	44.53	655.58	1308.94	1546.6	0.00	0.00	0.00	18.86	107.44	209.26	368.55
904	0	0	1.15	96.03	707	1360.37	1598.55	0.00	0.00	1.48	86.13	187.04	290.84	452.30
938	0	0	1.15	96.03	706.99	1360.35	1598.52	0.00	0.00	1.47	86.09	187.00	290.80	452.26
939	0	0	1.15	96.03	706.98	1360.35	1598.51	0.00	0.00	1.47	86.09	187.03	290.82	452.28
310	57.59	86.12	110.43	150.86	706.94	1360.31	1612.68	2.82	4.21	6.79	93.10	195.59	300.68	466.01
933	57.29	85.78	109.86	150.2	706.94	1360.3	1612.67	2.82	4.21	6.79	93.12	195.60	300.68	466.01
936	56.64	84.79	108.1	148.06	706.88	1360.25	1612.54	2.82	4.21	6.79	93.07	195.54	300.61	465.93
937	56.64	84.79	108.1	148.06	706.88	1360.24	1612.54	2.82	4.21	6.79	93.07	195.55	300.64	465.96
934	56.44	84.49	107.49	147.34	706.83	1360.2	1612.5	2.83	4.22	6.78	93.02	195.49	300.58	465.89
935	56.44	84.48	107.46	147	706.82	1360.19	1612.48	2.82	4.21	6.77	93.02	195.51	300.59	465.94
305	10.83	20.36	28.5	44.52	57.58	68.66	98.67	0.56	1.00	1.38	2.13	2.75	3.31	4.86
300	62.03	99.93	130.59	192.91	711.49	1370.68	1644.37	3.50	5.96	9.58	98.35	202.79	309.90	480.43
BT035	62.03	99.93	130.59	192.91	711.49	1370.68	1644.37	3.50	5.96	9.58	98.35	202.79	309.90	480.43

Table A.7 – Northern Tributary Existing Conditions Peak Flows and Volumes

Design Point	Existing Conditions Peak Flows (cfs)							Existing Conditions Runoff Volumes (ac-ft)						
	Q_2	Q_5	Q_{10}	Q_{25}	Q_{50}	Q_{100}	Q_{500}	V_2	V_5	V_{10}	V_{25}	V_{50}	V_{100}	V_{500}
665	1.46	20.37	40	91.43	125.96	159	243.16	0.13	1.74	3.56	8.63	12.24	16.05	25.48
675	7.2	98.9	197.32	472.8	659.63	857.42	1334.36	1.09	14.48	29.46	70.92	100.54	131.71	209.17
660	15.09	46.84	80.28	165.56	223.21	277.99	420.28	1.29	4.13	7.11	14.60	20.15	25.78	40.07
910	18.99	134.88	257.55	596.39	826.13	1070.44	1656.88	2.38	18.61	36.57	85.52	120.69	157.49	249.24
655	19.46	140.69	268.77	618.61	856.08	1109.49	1270.09	2.45	19.36	38.00	88.18	124.35	162.17	233.73
BT001	19.46	140.69	268.77	618.61	856.08	1109.49	1270.09	2.45	19.36	38.00	88.18	124.35	162.17	233.73
650	1.03	18.46	32.04	61.79	82.7	100.96	152.19	0.06	0.95	1.92	3.73	5.13	6.58	10.21
BT005	1.03	18.46	32.04	61.79	82.7	100.96	152.19	0.06	0.95	1.92	3.73	5.13	6.58	10.21
640	0.36	5.12	9.77	21.95	30.14	37.78	57.51	0.02	0.31	0.64	1.56	2.22	2.91	4.62
635	5.49	65.72	114.88	229.92	306.79	382.75	576.42	0.52	5.87	11.58	22.23	30.49	38.99	60.39
630	11.23	92.59	164.79	342.76	462.59	580.47	882.72	1.31	8.65	16.38	32.01	43.99	56.22	87.12
625	18.07	116.64	206.81	431.55	584.23	731.01	1113.71	1.94	10.99	20.47	40.36	55.56	71.02	110.22
BT010	18.07	116.64	206.81	431.55	584.23	731.01	1113.71	1.94	10.99	20.47	40.36	55.56	71.02	110.22
825	2.87	22.12	41.35	91.44	125.15	157.42	239.93	0.27	1.98	3.84	8.84	12.46	16.22	25.64
BT020	2.87	22.12	41.35	91.44	125.15	157.42	239.93	0.27	1.98	3.84	8.84	12.46	16.22	25.64
600	23.61	55.11	78.95	133.39	171.76	207.65	303.15	2.53	5.59	8.37	12.92	16.79	20.37	30.08
BT015	23.61	55.11	78.95	133.39	171.76	207.65	303.15	2.53	5.59	8.37	12.92	16.79	20.37	30.08
824	1.72	23.89	47.3	111.2	153.68	198.21	306.09	0.21	2.87	5.83	14.05	19.91	26.08	41.42
BT025	1.72	23.89	47.3	111.2	153.68	198.21	306.09	0.21	2.87	5.83	14.05	19.91	26.08	41.42
821	1.96	27.86	53.96	122.72	168.64	211.41	324.08	0.17	2.20	4.47	10.76	15.26	19.99	31.74
BT030	1.96	27.86	53.96	122.72	168.64	211.41	324.08	0.17	2.20	4.47	10.76	15.26	19.99	31.74
815	4.08	58.25	114.84	265.82	369.28	480.26	747.81	0.63	8.68	17.47	40.77	57.59	75.30	119.63
818	6.2	102.01	205.06	487.73	680.95	886.73	1385.45	1.24	16.50	33.14	78.04	110.29	144.22	228.95
BT040	6.2	102.01	205.06	487.73	680.95	886.73	1385.45	1.24	16.50	33.14	78.04	110.29	144.22	228.95
814	2.17	33.15	62.5	132.78	181.37	225.13	343.99	0.15	2.09	4.20	9.69	13.68	17.87	28.40
BT045	2.17	33.15	62.5	132.78	181.37	225.13	343.99	0.15	2.09	4.20	9.69	13.68	17.87	28.40
813	2.93	40.76	80.75	192.23	268.05	348.77	543.49	0.48	6.44	13.01	31.09	44.02	57.62	91.52
812	4.01	55.29	110.15	263.2	366.24	474.63	739.24	0.63	8.37	17.00	40.80	57.82	75.73	120.27
811	4.16	70.76	145.13	335.11	466.41	606.07	943.6	0.81	10.96	22.07	50.52	71.14	92.74	146.50
BT060	4.16	70.76	145.13	335.11	466.41	606.07	943.6	0.81	10.96	22.07	50.52	71.14	92.74	146.50
810	5.05	67.17	136.56	332.01	464.31	605.2	944.07	0.82	10.60	21.96	53.47	75.97	99.66	158.23
BT065	5.05	67.17	136.56	332.01	464.31	605.2	944.07	0.82	10.60	21.96	53.47	75.97	99.66	158.23
809	4.54	61.01	123.58	296.34	413.26	536.72	831.5	0.62	8.03	16.65	40.54	57.60	75.56	119.96
BT070	4.54	61.01	123.58	296.34	413.26	536.72	831.5	0.62	8.03	16.65	40.54	57.60	75.56	119.96
808	3.21	43.48	87.61	207.85	287.91	370.71	571.4	0.38	4.95	10.27	24.99	35.51	46.59	73.96
BT075	3.21	43.48	87.61	207.85	287.91	370.71	571.4	0.38	4.95	10.27	24.99	35.51	46.59	73.96
806	1.33	18.12	36.47	86.82	120.26	153.66	237.09	0.16	2.09	4.33	10.53	14.97	19.63	31.17
807	2.53	34.31	69.15	164.81	228.31	293.19	452.18	0.31	4.07	8.43	20.53	29.17	38.27	60.75
804	2.43	43.37	92.45	233.99	329.79	431.03	672.38	0.46	5.66	11.65	28.24	40.07	52.51	83.25
BT080	2.43	43.37	92.45	233.99	329.79	431.03	672.38	0.46	5.66	11.65	28.24	40.07	52.51	83.25
803	1.11	14.77	30.04	73.05	102.31	133.57	208.27	0.20	2.54	5.27	12.83	18.23	23.92	37.97
805	2.12	28.46	57.78	139.74	195.05	253.51	394.19	0.34	4.47	9.27	22.58	32.09	42.10	66.83
BT085	2.07	28.25	57.5	139.27	194.36	253.5	394.28	0.35	4.49	9.29	22.61	32.12	42.13	66.86

Table A.8 – Big Thompson Tributary Existing Conditions Peak Flows and Volumes

Design Point	Existing Conditions Peak Flows (cfs)							Existing Conditions Runoff Volumes (ac-ft)						
	Q_2	Q_5	Q_{10}	Q_{25}	Q_{50}	Q_{100}	Q_{500}	V_2	V_5	V_{10}	V_{25}	V_{50}	V_{100}	V_{500}
415	60.6	106.28	145.83	219.41	279.75	328.52	465.09	2.76	4.60	6.19	9.12	11.57	13.76	19.96
SV_S	60.6	106.28	145.83	219.41	279.75	328.52	465.09	2.76	4.60	6.19	9.12	11.57	13.76	19.96
925	1.14	1.89	2.55	3.85	5.25	6	6	1.56	2.60	3.50	5.16	6.63	7.99	10.95
SPR005	1.14	1.99	2.55	3.85	5.25	6	6	1.56	2.60	3.50	5.16	6.63	7.99	10.95
836	0.63	9.4	16.05	31.56	42.39	52.85	79.74	0.07	0.95	1.83	3.44	4.75	6.06	9.37
SPR010	0.63	9.4	16.05	31.56	42.39	52.85	79.74	0.07	0.95	1.83	3.44	4.75	6.06	9.37
405	130.14	230	304.85	468.91	602.94	695.99	997.34	6.76	11.15	14.99	22.01	27.92	33.18	48.05
834	20.46	36.91	50.03	79.17	100.56	119.66	171.57	1.76	3.00	4.06	6.03	7.68	9.16	13.34
CENTENNIAL	149.66	265	351.52	533.5	677.81	805.06	1140.73	8.52	14.15	19.05	28.04	35.61	42.34	61.39
CL_OUTLET	3.42	6	6	6	6	6	6	4.74	8.11	10.55	11.60	11.62	11.62	11.65
SPR001	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
915	3.42	6	6	6	6	6	6	4.74	8.10	10.54	11.58	11.60	11.61	11.63
835	19.51	48.24	70.7	125.59	164.87	199.63	293.91	1.19	2.67	4.07	7.11	9.51	11.81	17.89
BT055	19.52	48.27	70.79	126.02	165.57	200.42	296.51	5.90	10.73	14.56	18.62	21.03	23.34	29.45
838	29.93	45.87	63.27	91.48	115.28	129.01	179.93	1.12	1.74	2.26	3.11	3.85	4.50	6.36
BT046	29.93	45.87	63.27	91.48	115.28	129.01	179.93	1.12	1.74	2.26	3.11	3.85	4.50	6.36
837	3.85	8.77	12.79	22.45	29.39	35.4	51.93	0.26	0.55	0.82	1.38	1.84	2.26	3.41
BT047	3.85	8.77	12.79	22.45	29.39	35.4	51.93	0.26	0.55	0.82	1.38	1.84	2.26	3.41

Table A.9 – Western Tributary Future Conditions Peak Flows and Volumes

Design Point	Existing Conditions Peak Flows (cfs)							Existing Conditions Runoff Volumes (ac-ft)						
	Q_2	Q_5	Q_{10}	Q_{25}	Q_{50}	Q_{100}	Q_{500}	V_2	V_5	V_{10}	V_{25}	V_{50}	V_{100}	V_{500}
225	29.46	70.48	100.75	168.18	217.56	263.75	384.73	3.46	7.82	11.67	17.93	23.38	28.38	41.87
940	14.69	35.12	50.12	84.17	108.74	131.82	192.46	1.73	3.91	5.84	8.96	11.70	14.19	20.94
943	26.49	52.4	75.37	129.36	168.32	204.94	301.12	2.90	5.97	8.66	13.24	17.16	20.74	30.50
220	16.27	30.04	41.26	65.77	84.33	100.07	144.23	1.17	2.02	2.77	4.21	5.40	6.48	9.48
942	26.48	55.29	75.16	129.04	167.92	204.58	300.8	2.89	6.06	8.69	13.27	17.20	20.78	30.54
215	8.37	16.01	22.54	37.92	48.88	59.15	85.94	0.89	1.61	2.26	3.53	4.58	5.54	8.17
941	46.52	102.3	142.88	250.49	318.38	388.28	570.83	5.53	11.61	16.83	25.94	33.57	40.61	59.75
200	6.97	12.45	17.02	27.43	35.07	41.77	60.22	0.68	1.15	1.56	2.35	3.00	3.59	5.23
210	6.31	12.27	17.04	27.95	36.01	42.99	62.12	0.44	0.80	1.12	1.75	2.27	2.74	4.04
944	55.73	117.61	171.96	274.05	350.59	433.45	594.16	6.63	13.53	19.66	30.41	39.30	47.47	68.26
945	55.73	117.59	170.96	274.38	385.32	433.36	530.81	6.63	13.54	19.66	30.41	40.32	47.61	66.69
946	55.67	117.51	168.88	273.47	385.07	433.2	531.25	6.64	13.54	19.67	30.41	40.32	47.61	66.69
947	55.67	117.51	168.78	273.44	426.11	426.35	456.21	6.64	13.54	19.67	30.41	40.25	46.98	57.11
919	55.67	117.51	168.78	273.44	421.52	421.76	452.47	6.64	13.54	19.67	30.41	40.25	46.98	57.11
LT015	55.67	117.51	168.78	273.44	392.85	407.82	472.39	6.63	13.54	19.66	30.40	40.35	47.09	57.17

Table A.10 – Lola Park Tributary Future Conditions Peak Flows and Volumes

Design Point	Existing Conditions Peak Flows (cfs)							Existing Conditions Runoff Volumes (ac-ft)						
	Q_2	Q_5	Q_{10}	Q_{25}	Q_{50}	Q_{100}	Q_{500}	V_2	V_5	V_{10}	V_{25}	V_{50}	V_{100}	V_{500}
135	92.06	202.15	281.04	438.03	562.5	664.74	961.03	6.69	13.57	19.48	28.82	37.19	44.65	65.16
140	8.12	82.88	140.83	271.2	367.47	465.15	702.4	1.06	10.70	20.01	36.86	50.96	64.92	99.91
145	5.56	56.27	96.56	186.52	253.31	321.06	486.43	0.81	8.15	15.25	28.09	38.84	49.47	76.14
920	90.7	218.9	353.75	652.97	881.26	1120.62	1692.05	8.78	33.01	55.48	94.70	128.03	160.15	242.45
136	134.21	387.64	604.04	1106.56	1488.02	1889.14	2853.91	19.16	58.48	94.26	155.58	207.89	257.80	386.55
137	96.56	209.09	291.43	454.29	584.02	689.17	998.25	7.24	14.63	20.98	31.01	40.03	48.06	70.15
115	25.53	48.2	64.95	94.17	118.72	138.23	195.2	1.33	2.34	3.18	4.47	5.65	6.66	9.54
116	69.44	134.25	178.09	264.35	333.4	393.93	558.23	4.09	7.18	9.76	13.69	17.31	20.43	29.25
117	57.45	108.96	146.02	210.2	264.04	308.65	433.33	2.63	4.63	6.29	8.84	11.18	13.18	18.88
125	10.81	66.59	111.66	210.24	284.4	360.4	544.53	1.84	11.20	20.09	35.88	49.23	62.26	95.29
130	147.13	466.74	741.09	1356.26	1829.54	2321.57	3518.18	23.28	73.98	120.34	200.18	268.22	333.30	500.97
120	46.56	85.76	111.01	164.18	206.39	241.39	341.21	8.16	11.56	13.67	16.61	19.22	21.48	27.66
917	192.85	563.56	876.39	1563.17	2099.7	2653.29	3499.48	33.00	91.20	143.77	233.01	309.68	382.22	535.39
918	0	0	94.62	584.18	1073.75	1557.47	1718.27	0.00	0.00	26.20	115.43	192.07	264.59	368.90
110	47.6	87.4	118.09	582.91	1075.1	1562.22	1741.95	2.93	5.00	33.06	125.81	205.37	280.50	391.90
100	32.6	62.14	87.05	147.02	191.09	231.52	341.51	3.35	5.81	8.00	12.18	15.65	18.79	27.50
101	4.93	9.2	12.75	20.53	26.43	31.34	45.43	0.41	0.71	0.98	1.49	1.92	2.31	3.38
102	10.34	19.26	26.71	43.09	55.49	65.85	95.53	0.88	1.53	2.11	3.23	4.16	5.00	7.33
105	43.57	66.04	76.22	103.38	121.48	139.08	183.7	3.16	5.76	29.31	41.76	46.12	49.25	55.92
45	5.24	10.03	14.15	23.36	30.17	36.28	52.55	0.46	0.83	1.17	1.82	2.36	2.86	4.21
950	79.62	135.27	174.08	270.16	338.11	401.27	569.99	6.98	12.42	38.51	55.78	64.15	70.92	87.66
900	79.61	135.27	174.07	270.15	360.78	401.25	569.96	6.98	12.41	38.49	55.77	64.61	70.98	87.69
901	79.57	135.25	174.04	270.12	360.71	401.22	569.88	6.98	12.41	38.49	55.76	64.61	70.98	87.68
931	79.57	135.24	174.03	270.12	395.65	401.21	569.88	6.98	12.41	38.49	55.76	64.79	71.00	87.72
932	79.54	135.23	174.01	270.1	410.82	401.19	569.82	6.98	12.41	38.49	55.76	64.79	71.00	87.72
902	79.53	135.05	173.94	270.04	399.59	401.13	569.72	6.98	12.41	38.49	55.77	64.80	71.02	87.74
916	91.67	156.16	204.18	320.87	465.86	481.03	687.28	8.13	14.39	41.21	59.90	70.10	77.38	97.06
20	17.01	31.54	43.1	68.75	87.95	104.71	150.28	1.15	1.98	2.72	4.13	5.31	6.37	9.32
905	91.66	156.16	204.18	320.86	490.77	495.95	687.28	8.13	14.39	41.21	59.90	70.22	77.54	97.10
15	3.79	7.09	9.69	15.62	19.98	23.8	34.2	0.26	0.46	0.64	0.97	1.25	1.50	2.21
205	2.65	4.84	6.67	10.16	13	15.4	22.07	0.15	0.25	0.35	0.52	0.66	0.79	1.16
206	1.59	3.13	4.36	7.12	9.18	10.92	15.86	0.13	0.23	0.33	0.50	0.65	0.79	1.17
10	4.54	9.06	12.71	20.26	26.2	31.41	45.78	0.29	0.53	0.75	1.15	1.49	1.80	2.65
930	4.54	9.06	13.22	20.26	26.2	31.41	45.78	0.29	0.53	0.75	1.15	1.49	1.80	2.65
926	7.1	13.77	19.61	30.14	38.87	46.46	67.43	0.44	0.79	1.10	1.67	2.15	2.59	3.81
25	7.07	11.21	14.34	20.01	24.84	29.32	40.68	0.32	0.49	0.64	0.88	1.09	1.27	1.80
951	7.07	11.21	14.34	20.01	24.84	29.32	40.68	0.32	0.49	0.64	0.88	1.09	1.27	1.80
30	8.06	13.93	18.42	28.3	35.69	42.26	59.87	0.53	0.87	1.17	1.70	2.16	2.56	3.70
952	14.91	20.39	24.88	34.76	42.14	48.71	66.32	0.85	1.30	1.68	2.26	2.77	3.19	4.42
40	2.92	4.79	6.4	9.42	11.9	13.83	19.61	0.19	0.30	0.39	0.56	0.70	0.82	1.17
953	4.61	6.48	8.09	11.1	13.58	15.51	21.3	0.48	0.60	0.71	0.87	1.02	1.14	1.51
5	39.71	65.02	85.62	126.76	160.28	188.29	267.93	2.09	3.42	4.55	6.50	8.19	9.68	13.94
IRR_RETURN	4.52	5.23	5.23	5.23	5.23	5.23	5.23	0.48	0.58	0.64	0.66	0.69	0.70	0.76
1	136.05	240.62	312.81	492.2	675.69	792.26	1059.97	12.26	21.07	50.04	72.44	85.97	96.11	123.74

Table A.11 – Eastern Tributary Future Conditions Peak Flows and Volumes

Design Point	Existing Conditions Peak Flows (cfs)							Existing Conditions Runoff Volumes (ac-ft)						
	Q_2	Q_5	Q_{10}	Q_{25}	Q_{50}	Q_{100}	Q_{500}	V_2	V_5	V_{10}	V_{25}	V_{50}	V_{100}	V_{500}
355	133.96	247.22	323.89	481.88	603.86	712.33	1004.61	9.35	16.33	22.14	30.97	39.12	46.09	65.92
360	172.22	336.32	452.92	698.19	885.74	1050.99	1503.19	13.26	24.29	33.59	47.92	61.01	72.41	104.33
350	17.73	31.52	42.24	64.26	81.14	95.62	136.08	1.19	1.99	2.67	3.89	4.92	5.84	8.46
345	20.41	35.88	47.55	73.01	92.23	109.56	155.35	1.26	2.08	2.79	4.10	5.20	6.17	8.94
340	3.73	6.44	8.64	13.77	17.45	20.75	29.77	0.44	0.73	0.98	1.43	1.81	2.15	3.12
922	178.02	342.31	459.63	709.92	899.69	1067.65	1527.02	16.21	29.16	40.11	57.39	73.00	86.72	124.74
335	156.73	268.02	355.57	524.89	659.75	775.43	1094.4	8.74	14.25	18.91	27.01	33.97	40.08	57.63
957	243.14	470.34	641.2	1030.81	1319.95	1584.27	2294.35	25.06	43.57	59.21	84.62	107.20	127.02	182.60
927	243.11	470.31	641.16	1030.77	1207.85	1207.85	1207.85	25.13	43.59	59.23	84.64	105.93	118.93	142.05
948	232.82	450.12	614.59	996.63	1212.09	1226.86	1233.9	25.47	43.99	59.70	84.98	106.25	119.25	142.39
949	232.69	449.81	614.36	996.18	1211.63	1226.35	1233.29	25.51	44.02	59.72	85.02	106.29	119.29	142.43
330	73.63	128.65	173.75	257.7	327.63	389.31	547.76	3.08	5.09	6.85	10.06	12.76	15.17	21.96
325	81.66	140.88	191.79	294.98	375.98	441.14	630.74	5.43	8.96	12.05	17.68	22.43	26.65	38.59
956	81.66	145.64	205.98	518.41	1009.01	1496.78	1712.32	5.43	9.92	19.20	109.10	191.35	269.39	391.00
320	11.04	21.33	30.02	49.27	63.87	76.03	110.71	0.88	1.59	2.23	3.47	4.51	5.46	8.05
EHRLICH	289.41	571.86	811.92	1369.1	1697.72	1880.61	2326.61	34.90	60.61	88.00	207.64	314.90	409.29	563.43
959	0	13.84	41.9	406.71	1058.43	1568.41	2038.6	0.00	13.80	38.96	151.46	257.28	351.03	504.77
960	0	13.84	41.9	55.71	55.71	55.69	55.66	0.00	13.79	38.94	80.02	82.50	83.49	84.93
958	0	13.84	41.9	56.8	56.6	56.55	56.35	0.00	13.79	38.93	80.00	82.48	83.47	84.90
906	0	0	0	355.14	1006.86	1516.85	1546.6	0.00	0.00	0.00	71.44	174.77	267.53	386.06
904	0	13.84	41.9	406.58	1058.31	1568.31	1598.49	0.00	13.77	38.90	151.37	257.19	350.94	470.91
938	0	13.84	41.9	406.56	1058.29	1568.3	1598.46	0.00	13.76	38.88	151.34	257.15	350.90	470.86
939	0	13.84	41.9	406.56	1058.29	1568.3	1598.45	0.00	13.76	38.88	151.37	257.18	350.93	470.89
310	57.59	86.12	110.43	406.53	1058.26	1568.61	1614.87	2.82	17.96	44.19	158.37	265.75	360.78	484.62
933	57.29	85.78	109.86	406.53	1058.25	1568.61	1614.87	2.82	17.96	44.18	158.37	265.75	360.78	484.62
936	56.64	84.79	108.1	406.48	1058.21	1568.57	1614.84	2.82	17.94	44.15	158.31	265.68	360.71	484.54
937	56.64	84.79	108.1	406.48	1058.2	1568.57	1614.84	2.82	17.94	44.15	158.32	265.69	360.74	484.57
934	56.44	84.49	107.49	406.44	1058.17	1568.54	1614.82	2.83	17.93	44.13	158.27	265.63	360.67	484.51
935	56.44	84.48	107.46	406.43	1058.16	1568.53	1614.82	2.82	17.92	44.12	158.32	265.68	360.72	484.51
305	11.31	21.18	29.49	45.7	58.93	70.23	100.59	0.59	1.02	1.41	2.15	2.77	3.33	4.87
300	62.56	100.71	131.51	409.4	1068.14	1584.5	1657.83	3.58	19.71	46.97	163.73	273.09	370.14	499.13
BT035	62.56	100.71	131.51	409.4	1068.14	1584.5	1657.83	3.58	19.71	46.97	163.73	273.09	370.14	499.13

Table A.12 – Northern Tributary Future Conditions Peak Flows and Volumes

Design Point	Existing Conditions Peak Flows (cfs)							Existing Conditions Runoff Volumes (ac-ft)						
	Q_2	Q_5	Q_{10}	Q_{25}	Q_{50}	Q_{100}	Q_{500}	V_2	V_5	V_{10}	V_{25}	V_{50}	V_{100}	V_{500}
665	4.41	24.36	44.18	95.77	130.54	162.91	248.41	0.41	2.19	4.11	9.12	12.79	16.57	26.08
675	7.2	98.9	197.32	472.8	659.63	857.42	1334.36	1.09	14.48	29.46	70.92	100.54	131.71	209.17
660	16.74	51.52	85.34	170.46	228.49	283.58	426.42	1.57	4.58	7.67	15.09	20.70	26.29	40.67
910	21.89	138.18	260.94	599.28	828.94	1073.34	1659.53	2.66	19.06	37.12	86.01	121.24	158.01	249.84
655	22.3	144.04	272.19	621.54	858.93	1112.39	1270.2	2.73	19.81	38.55	88.68	124.90	162.68	234.12
BT001	22.3	144.04	272.19	621.54	858.93	1112.39	1270.2	2.73	19.81	38.55	88.68	124.90	162.68	234.12
650	1.03	18.46	32.04	61.79	82.7	100.96	152.19	0.06	0.95	1.92	3.73	5.13	6.58	10.21
BT005	1.03	18.46	32.04	61.79	82.7	100.96	152.19	0.06	0.95	1.92	3.73	5.13	6.58	10.21
640	6.38	14.29	20.63	35.85	46.76	56.32	82.47	0.42	0.86	1.28	2.15	2.84	3.50	5.25
635	14.83	77.54	127.45	242.39	321.47	395.7	594.83	1.44	7.17	13.03	23.59	31.99	40.40	61.96
630	34.54	125.88	204.19	392.21	520.98	644.11	965.47	3.65	11.81	19.95	35.34	47.56	59.58	90.72
625	41.04	151.56	248.41	484.06	645.14	798.66	1199.62	4.27	14.15	24.04	43.70	59.13	74.37	113.82
BT010	41.04	151.56	248.41	484.06	645.14	798.66	1199.62	4.27	14.15	24.04	43.70	59.13	74.37	113.82
825	5.07	25.18	44.69	95.26	129.41	161.21	245.56	0.48	2.32	4.26	9.22	12.88	16.62	26.10
BT020	5.07	25.18	44.69	95.26	129.41	161.21	245.56	0.48	2.32	4.26	9.22	12.88	16.62	26.10
600	23.61	55.11	78.95	133.39	171.76	207.65	303.15	2.53	5.59	8.37	12.92	16.79	20.37	30.08
BT015	23.61	55.11	78.95	133.39	171.76	207.65	303.15	2.53	5.59	8.37	12.92	16.79	20.37	30.08
824	1.72	23.89	47.3	111.2	153.68	198.21	306.09	0.21	2.87	5.83	14.05	19.91	26.08	41.42
BT025	1.72	23.89	47.3	111.2	153.68	198.21	306.09	0.21	2.87	5.83	14.05	19.91	26.08	41.42
821	6.9	34.44	60.78	129.63	175.82	219.18	332.09	0.61	2.90	5.32	11.53	16.11	20.79	32.65
BT030	6.9	34.44	60.78	129.63	175.82	219.18	332.09	0.61	2.90	5.32	11.53	16.11	20.79	32.65
815	4.08	58.25	114.84	265.82	369.28	480.26	747.81	0.63	8.68	17.47	40.77	57.59	75.30	119.63
818	9.33	106.75	210.08	491.85	684.83	890.26	1388.06	1.83	17.45	34.31	79.08	111.46	145.32	230.20
BT040	9.33	106.75	210.08	491.85	684.83	890.26	1388.06	1.83	17.45	34.31	79.08	111.46	145.32	230.20
814	2.17	33.15	62.5	132.78	181.37	225.13	343.99	0.15	2.09	4.20	9.69	13.68	17.87	28.40
BT045	2.17	33.15	62.5	132.78	181.37	225.13	343.99	0.15	2.09	4.20	9.69	13.68	17.87	28.40
813	2.93	40.76	80.75	192.23	268.05	348.77	543.49	0.48	6.44	13.01	31.09	44.02	57.62	91.52
812	4.01	55.29	110.15	263.2	366.24	474.63	739.24	0.63	8.37	17.00	40.80	57.82	75.73	120.27
811	4.16	70.76	145.13	335.11	466.41	606.07	943.6	0.81	10.96	22.07	50.52	71.14	92.74	146.50
BT060	4.16	70.76	145.13	335.11	466.41	606.07	943.6	0.81	10.96	22.07	50.52	71.14	92.74	146.50
810	5.05	67.17	136.56	332.01	464.31	605.2	944.07	0.82	10.60	21.96	53.47	75.97	99.66	158.23
BT065	5.05	67.17	136.56	332.01	464.31	605.2	944.07	0.82	10.60	21.96	53.47	75.97	99.66	158.23
809	4.54	61.01	123.58	296.34	413.26	536.72	831.5	0.62	8.03	16.65	40.54	57.60	75.56	119.96
BT070	4.54	61.01	123.58	296.34	413.26	536.72	831.5	0.62	8.03	16.65	40.54	57.60	75.56	119.96
808	3.21	43.48	87.61	207.85	287.91	370.71	571.4	0.38	4.95	10.27	24.99	35.51	46.59	73.96
BT075	3.21	43.48	87.61	207.85	287.91	370.71	571.4	0.38	4.95	10.27	24.99	35.51	46.59	73.96
806	4.77	23.04	41.87	91.96	125.75	159.69	243.91	0.59	2.78	5.17	11.29	15.81	20.43	32.08
807	5.96	39.15	74.35	169.96	233.81	297.68	457.07	0.75	4.76	9.27	21.29	30.01	39.06	61.66
804	64.31	125.5	175.49	275.57	357.82	430.32	661.45	3.67	10.08	16.72	32.88	45.04	57.20	88.38
BT080	64.31	125.5	175.49	275.57	357.82	430.32	661.45	3.67	10.08	16.72	32.88	45.04	57.20	88.38
803	8.91	26.71	44.19	90.91	123.26	157.56	239.81	1.62	4.70	7.83	15.18	20.80	26.35	40.69
805	29.01	69.86	108.19	205.97	273.62	340.9	510.76	4.25	10.11	15.87	28.70	38.70	48.38	73.80
BT085	28.67	69.47	107.53	205.52	273.14	340.3	510.28	4.26	10.13	15.89	28.71	38.71	48.40	73.82

Table A.13 – Big Thompson Tributary Future Conditions Peak Flows and Volumes

Design Point	Existing Conditions Peak Flows (cfs)							Existing Conditions Runoff Volumes (ac-ft)						
	Q_2	Q_5	Q_{10}	Q_{25}	Q_{50}	Q_{100}	Q_{500}	V_2	V_5	V_{10}	V_{25}	V_{50}	V_{100}	V_{500}
415	64.77	111.58	151.74	225.85	286.85	336.37	474.48	2.89	4.76	6.35	9.25	11.69	13.85	20.00
SV_S	64.77	111.58	151.74	225.85	286.85	336.37	474.48	2.89	4.76	6.35	9.25	11.69	13.85	20.00
925	1.19	1.96	2.61	3.92	5.32	6	6	1.64	2.69	3.59	5.23	6.71	8.05	10.97
SPR005	1.19	1.99	2.61	3.92	5.32	6	6	1.64	2.69	3.59	5.23	6.71	8.05	10.97
836	72.02	102.43	124.62	159.16	190.04	212.05	285.05	3.36	4.85	5.98	7.48	8.96	10.09	13.66
SPR010	72.02	102.43	124.62	159.16	190.04	212.05	285.05	3.36	4.85	5.98	7.48	8.96	10.09	13.66
405	130.14	230	304.85	468.91	602.94	695.99	997.34	6.76	11.15	14.99	22.01	27.92	33.18	48.05
834	21.5	38.3	51.62	81.27	103.02	122.51	175.26	1.81	3.05	4.13	6.09	7.74	9.22	13.40
CENTENNIAL	150.77	266.56	353.38	535.98	680.51	808.44	1145.21	8.57	14.21	19.12	28.10	35.67	42.40	61.45
CL_OUTLET	3.44	6	6	6	6	6	6	4.77	8.14	10.58	11.60	11.62	11.62	11.65
SPR001	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
915	3.44	6	6	6	6	6	6	4.77	8.13	10.56	11.58	11.60	11.61	11.63
835	125.98	184.07	225.85	293.54	355.56	417.22	563.92	4.89	7.22	9.06	11.78	14.32	16.35	22.57
BT055	125.98	184.07	225.85	293.54	355.59	417.26	564.12	9.63	15.32	19.57	23.28	25.84	27.88	34.13
838	55.84	79.9	99.91	128.44	154.99	171.71	231.11	1.86	2.70	3.35	4.26	5.14	5.83	7.96
BT046	55.84	79.9	99.91	128.44	154.99	171.71	231.11	1.86	2.70	3.35	4.26	5.14	5.83	7.96
837	29.51	41.66	51.1	65.2	78.01	85.58	114.97	1.17	1.68	2.07	2.61	3.12	3.52	4.78
BT047	29.51	41.66	51.1	65.2	78.01	85.58	114.97	1.17	1.68	2.07	2.61	3.12	3.52	4.78

Table A.14 - Existing Conditions SWMM Input/Output

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EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)
--------------------------------------------------------------

INP file created on 6/18/2014 7:11:51 AM by jdeischer with inpPINS version 0.0.2.0
Title/Notes:

*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Flow Routing Method ...... KINWAVE
Starting Date ............ JUN-01-2014 00:00:00
Ending Date .............. JUN-02-2014 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Routing Time Step ........ 5.00 sec

WARNING 04: minimum elevation drop used for Conduit CE804

WARNING 04: minimum elevation drop used for Conduit D025

WARNING 04: minimum elevation drop used for Conduit D030

WARNING 04: minimum elevation drop used for Conduit D040

WARNING 04: minimum elevation drop used for Conduit D325

WARNING 08: elevation drop exceeds length for Conduit D330

WARNING 04: minimum elevation drop used for Conduit D335

WARNING 02: maximum depth increased for Node 941

WARNING 02: maximum depth increased for Node 942

WARNING 02: maximum depth increased for Node 959

*************
Element Count
*************
Number of rain gages ...... 0
Number of subcatchments ... 0
Number of nodes ........... 165
Number of links ........... 166
Number of pollutants ...... 0
Number of land uses ....... 0
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************
Node Summary
************
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Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
005	JUNCTION	4739.40	7.00	0.0	
015	JUNCTION	4746.20	7.50	0.0	
020	JUNCTION	4744.71	0.00	0.0	
025	JUNCTION	4742.88	0.00	0.0	
030	JUNCTION	4742.20	0.00	0.0	
040	JUNCTION	4742.17	0.00	0.0	
045	JUNCTION	4752.78	0.00	0.0	
100	JUNCTION	4763.70	5.00	0.0	
101	JUNCTION	4795.89	2.00	0.0	
102	JUNCTION	4792.00	2.00	0.0	
105	JUNCTION	4760.50	5.00	0.0	
115	JUNCTION	4857.00	10.00	0.0	
116	JUNCTION	4798.20	10.00	0.0	
117	JUNCTION	4828.00	10.00	0.0	
125	JUNCTION	4806.80	0.00	0.0	
135	JUNCTION	5624.00	10.00	0.0	
136	JUNCTION	4828.00	10.00	0.0	
137	JUNCTION	4839.00	10.00	0.0	
140	JUNCTION	4887.20	5.00	0.0	
145	JUNCTION	4890.30	5.00	0.0	
200	JUNCTION	4766.52	0.00	0.0	
205	JUNCTION	4751.00	2.00	0.0	
206	JUNCTION	4748.40	3.00	0.0	
215	JUNCTION	4771.20	0.00	0.0	
220	JUNCTION	4775.70	0.00	0.0	
300	JUNCTION	4721.60	10.00	0.0	
305	JUNCTION	4737.70	5.00	0.0	
320	JUNCTION	4750.40	4.00	0.0	
325	JUNCTION	4751.00	0.00	0.0	
330	JUNCTION	4754.50	0.00	0.0	
335	JUNCTION	4745.97	0.00	0.0	
340	JUNCTION	4758.20	0.00	0.0	
345	JUNCTION	4766.50	0.00	0.0	
350	JUNCTION	4767.80	5.00	0.0	
355	JUNCTION	4787.00	10.00	0.0	
360	JUNCTION	4779.80	10.00	0.0	
405	JUNCTION	4725.10	0.00	0.0	
415	JUNCTION	4731.50	0.00	0.0	
500	JUNCTION	4772.80	0.00	0.0	
505	JUNCTION	4779.10	0.00	0.0	
510	JUNCTION	4784.10	0.00	0.0	
600	JUNCTION	4738.50	0.00	0.0	
625	JUNCTION	4794.60	0.00	0.0	
630	JUNCTION	4803.80	5.00	0.0	
635	JUNCTION	4859.80	5.00	0.0	
640	JUNCTION	4908.70	5.00	0.0	
650	JUNCTION	4773.50	0.00	0.0	
655	JUNCTION	4779.30	5.00	0.0	
660	JUNCTION	4795.10	5.00	0.0	
665	JUNCTION	4861.30	5.00	0.0	
675	JUNCTION	4800.50	0.00	0.0	
803	JUNCTION	4777.50	0.00	0.0	
804	JUNCTION	4712.10	5.00	0.0	
805	JUNCTION	4777.30	5.00	0.0	
806	JUNCTION	4734.50	0.00	0.0	

Table A.14 - Existing Conditions SWMM Input/Output

807	JUNCTION	4733.10	5.00	0.0
808	JUNCTION	4725.40	0.00	0.0
809	JUNCTION	4724.50	0.00	0.0
810	JUNCTION	4721.80	0.00	0.0
811	JUNCTION	4712.90	5.00	0.0
812	JUNCTION	4759.00	5.00	0.0
813	JUNCTION	4760.50	0.00	0.0
814	JUNCTION	4729.80	0.00	0.0
815	JUNCTION	4770.10	5.00	0.0
818	JUNCTION	4716.10	5.00	0.0
821	JUNCTION	4765.10	0.00	0.0
824	JUNCTION	4731.90	0.00	0.0
825	JUNCTION	4738.10	0.00	0.0
834	JUNCTION	4734.00	0.00	0.0
835	JUNCTION	4715.60	0.00	0.0
836	JUNCTION	4736.90	0.00	0.0
837	JUNCTION	4727.10	0.00	0.0
838	JUNCTION	4724.60	0.00	0.0
900	JUNCTION	4750.33	6.00	0.0
902	JUNCTION	4746.33	12.00	0.0
903	JUNCTION	4733.31	12.00	0.0
904	JUNCTION	4737.20	10.00	0.0
905	JUNCTION	4743.28	5.00	0.0
906	JUNCTION	4749.74	5.00	0.0
910	JUNCTION	4788.00	5.00	0.0
915	JUNCTION	4725.30	5.00	0.0
917	JUNCTION	4797.90	10.00	0.0
918	JUNCTION	4785.40	15.00	0.0
920	JUNCTION	4856.00	10.00	0.0
922	JUNCTION	4756.40	10.00	0.0
925	JUNCTION	4739.90	3.00	0.0
926	JUNCTION	4744.00	5.00	0.0
927	JUNCTION	4745.56	10.00	0.0
928	JUNCTION	4800.71	5.00	0.0
929	JUNCTION	4801.58	6.00	0.0
930	JUNCTION	4744.59	4.00	0.0
931	JUNCTION	4746.62	20.00	0.0
933	JUNCTION	4729.78	11.00	0.0
935	JUNCTION	4726.81	10.00	0.0
937	JUNCTION	4728.79	10.00	0.0
939	JUNCTION	4733.63	10.00	0.0
945	JUNCTION	4744.45	5.00	0.0
946	JUNCTION	4743.32	6.00	0.0
947	JUNCTION	4743.27	6.00	0.0
949	JUNCTION	4741.36	12.00	0.0
956	JUNCTION	4751.00	5.00	0.0
958	JUNCTION	4742.13	8.09	0.0
960	JUNCTION	4743.32	7.23	0.0
BT001	OUTFALL	4779.20	0.00	0.0
BT005	OUTFALL	4773.40	0.00	0.0
BT010	OUTFALL	4794.50	0.00	0.0
BT015	OUTFALL	4738.40	0.00	0.0
BT020	OUTFALL	4738.00	0.00	0.0
BT025	OUTFALL	4731.80	0.00	0.0
BT030	OUTFALL	4765.00	0.00	0.0
BT035	OUTFALL	4721.50	0.00	0.0
BT040	OUTFALL	4716.00	0.00	0.0
BT045	OUTFALL	4729.70	0.00	0.0
BT046	OUTFALL	4724.50	0.00	0.0
BT047	OUTFALL	4727.00	0.00	0.0
BT055	OUTFALL	4715.50	5.00	0.0
BT060	OUTFALL	4712.80	0.00	0.0
BT065	OUTFALL	4721.70	0.00	0.0
BT070	OUTFALL	4724.40	0.00	0.0
BT075	OUTFALL	4725.30	0.00	0.0
BT080	OUTFALL	4712.10	0.00	0.0
BT085	OUTFALL	4684.80	5.00	0.0
LT001	OUTFALL	4752.60	0.00	0.0
LT005	OUTFALL	4741.00	0.00	0.0
LT010	OUTFALL	4740.20	0.00	0.0
LT015	OUTFALL	4738.33	6.00	0.0
LT020	OUTFALL	4729.00	5.00	0.0
SPR001	OUTFALL	4731.60	1.00	0.0
SPR005	OUTFALL	4737.90	3.00	0.0
SPR010	OUTFALL	4736.80	0.00	0.0
IRR_RETURN	OUTFALL	4741.75	2.00	0.0
001	DIVIDER	4733.81	12.00	0.0
010	DIVIDER	4746.29	4.00	0.0
951	DIVIDER	4742.88	11.02	0.0
952	DIVIDER	4742.20	12.60	0.0
953	DIVIDER	4742.17	14.63	0.0
110	DIVIDER	4772.20	6.00	0.0
120	DIVIDER	4801.71	5.00	0.0
130	DIVIDER	4801.79	10.00	0.0
210	DIVIDER	4758.60	2.00	0.0
225	DIVIDER	4792.40	2.50	0.0
310	DIVIDER	4730.18	11.00	0.0
901	DIVIDER	4747.25	9.56	0.0
916	DIVIDER	4744.74	10.00	0.0
919	DIVIDER	4740.52	8.80	0.0
923	DIVIDER	4757.26	5.00	0.0
932	DIVIDER	4746.61	20.00	0.0
934	DIVIDER	4728.20	10.00	0.0
936	DIVIDER	4729.32	10.00	0.0
938	DIVIDER	4734.40	10.00	0.0
940	DIVIDER	4768.92	8.00	0.0
941	DIVIDER	4761.90	8.60	0.0
942	DIVIDER	4765.24	8.00	0.0
943	DIVIDER	4767.57	8.00	0.0
948	DIVIDER	4744.55	12.00	0.0
CL_Outlet	DIVIDER	4731.70	12.20	0.0
950	DIVIDER	4752.81	9.00	0.0
957	DIVIDER	4745.97	10.00	0.0
959	DIVIDER	4743.69	8.72	0.0
944	DIVIDER	4757.24	12.00	0.0
Centennial	STORAGE	4725.00	12.00	0.0
CF	STORAGE	4760.00	5.52	0.0
Ehrlich	STORAGE	4740.00	13.00	0.0
PH	STORAGE	4782.00	15.00	0.0
SV_S	STORAGE	4731.00	7.00	0.0

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Link Summary
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Name	From Node	To Node	Type	Length	%Slope	Roughness
CE001	001	903	CONDUIT	83.0	0.6024	0.0160
CE001_OF	001	903	CONDUIT	85.0	0.5882	0.0400
CE405	405	Centennial	CONDUIT	10.0	1.0001	0.0400
CE415	415	SV_S	CONDUIT	10.0	5.0063	0.0400
CE500	500	LT010	CONDUIT	470.0	6.9529	0.0100
CE505	505	LT005	CONDUIT	1772.0	2.1506	0.0100
CE510	510	LT001	CONDUIT	1000.0	3.1516	0.0100

Table A.14 - Existing Conditions SWMM Input/Output

CE600	600	BT015	CONDUIT	100.0	0.1000	0.0100
CE625	625	BT010	CONDUIT	100.0	0.1000	0.0100
CE630	630	625	CONDUIT	100.0	9.2392	0.0400
CE635	635	630	CONDUIT	2120.0	2.6424	0.0400
CE640	640	630	CONDUIT	2771.0	3.7884	0.0400
CE650	650	BT005	CONDUIT	100.0	0.1000	0.0100
CE655	655	BT001	CONDUIT	100.0	0.1000	0.0100
CE660	660	910	CONDUIT	287.0	2.4746	0.0400
CE665	665	660	CONDUIT	2393.0	2.7675	0.0100
CE675	675	910	CONDUIT	100.0	12.5988	0.0400
CE803	803	805	CONDUIT	100.0	0.2000	0.0400
CE804	804	BT080	CONDUIT	100.0	0.0010	0.0100
CE805	805	BT085	CONDUIT	2405.0	3.8490	0.0400
CE806	806	807	CONDUIT	100.0	1.4001	0.0400
CE807	807	804	CONDUIT	2738.0	0.7670	0.0400
CE808	808	BT075	CONDUIT	100.0	0.1000	0.0100
CE809	809	BT070	CONDUIT	100.0	0.1000	0.0100
CE810	810	BT065	CONDUIT	100.0	0.1000	0.0100
CE811	811	BT060	CONDUIT	100.0	0.1000	0.0100
CE813	813	812	CONDUIT	100.0	1.5002	0.0100
CE814	814	BT045	CONDUIT	100.0	0.1000	0.0100
CE815	815	818	CONDUIT	4103.0	1.3162	0.0400
CE818	818	BT040	CONDUIT	100.0	0.1000	0.0100
CE821	821	BT030	CONDUIT	100.0	0.1000	0.0100
CE824	824	BT025	CONDUIT	100.0	0.1000	0.0100
CE825	825	BT020	CONDUIT	100.0	0.1000	0.0100
CE834	834	Centennial	CONDUIT	100.0	9.0367	0.0100
CE835	835	BT055	CONDUIT	10.0	1.0001	0.0100
CE837	837	BT047	CONDUIT	10.0	1.0001	0.0100
CE838	838	BT046	CONDUIT	100.0	0.1000	0.0100
CE910	910	655	CONDUIT	1067.0	0.8154	0.0400
CE911	812	811	CONDUIT	3487.0	1.3222	0.0400
CE915	915	BT055	CONDUIT	1025.0	0.9561	0.0400
CL_Out	CL_Outlet	915	CONDUIT	680.0	0.9412	0.0160
CL_Spill	CL_Outlet	SPR001	CONDUIT	100.0	11.3728	0.0400
D020	020	916	CONDUIT	10.0	-0.3000	0.0100
D025	025	951	CONDUIT	10.0	0.0100	0.0100
D030	030	952	CONDUIT	10.0	0.0100	0.0100
D040	040	953	CONDUIT	10.0	0.0100	0.0100
D200	200	944	CONDUIT	10.0	249.0739	0.0100
D215	215	941	CONDUIT	10.0	253.0202	0.0100
D220	220	943	CONDUIT	10.0	139.6275	0.0100
D325	325	956	CONDUIT	10.0	0.0100	0.0100
D330	330	Ehrlich	CONDUIT	10.0	145.0000	0.0100
D335	335	957	CONDUIT	10.0	0.0100	0.0100
D340	340	923	CONDUIT	10.0	9.4418	0.0100
D345	345	CF	CONDUIT	10.0	85.5337	0.0100
E110_OF	110	956	CONDUIT	3521.0	0.6305	0.0400
E300	300	BT035	CONDUIT	10.0	1.0001	0.0100
E305	305	300	CONDUIT	400.0	4.0283	0.0400
E310	310	933	CONDUIT	80.0	0.5000	0.0300
E310_OF	310	933	CONDUIT	80.0	0.5000	0.0160
E320	320	Ehrlich	CONDUIT	122.0	8.5557	0.0200
E350	350	CF	CONDUIT	1140.0	0.6842	0.0200
E355	355	360	CONDUIT	1630.0	0.4417	0.0400
E360	360	922	CONDUIT	2018.0	1.1596	0.0400
E904	904	938	CONDUIT	400.0	0.7000	0.0160
E906	906	904	CONDUIT	1000.0	1.2541	0.0160
E922	922	957	CONDUIT	1877.0	0.5557	0.0400
E923	923	922	CONDUIT	455.0	0.1890	0.0160
E923_OF	923	922	CONDUIT	455.0	1.0682	0.0400
E927	927	948	CONDUIT	1545.0	0.0654	0.0400
E933	933	936	CONDUIT	380.0	0.1211	0.0160
E934	934	935	CONDUIT	130.0	1.0693	0.0300
E934_OF	934	935	CONDUIT	130.0	1.0693	0.0300
E935	935	300	CONDUIT	1850.0	0.2816	0.0160
E936	936	937	CONDUIT	40.0	1.3251	0.0160
E936_OF	936	937	CONDUIT	40.0	1.3251	0.0300
E937	937	934	CONDUIT	375.0	0.1573	0.0160
E938	938	939	CONDUIT	30.0	2.5675	0.0160
E938_OF	938	939	CONDUIT	30.0	2.5675	0.0300
E939	939	310	CONDUIT	340.0	1.0148	0.0400
E948	948	949	CONDUIT	330.0	0.9667	0.0160
E948_OF	948	949	CONDUIT	330.0	0.9667	0.0400
E956	956	Ehrlich	CONDUIT	500.0	2.2005	0.0200
E957	957	927	CONDUIT	100.0	0.4100	0.0160
E957_OF	957	927	CONDUIT	100.0	0.4100	0.0200
E958	958	904	CONDUIT	915.0	0.5388	0.0160
E959	959	960	CONDUIT	190.0	0.1947	0.0160
E959_OF	959	906	CONDUIT	400.0	0.1675	0.0100
E960	960	958	CONDUIT	300.0	0.3967	0.0160
Eh_In	949	Ehrlich	CONDUIT	10.0	13.7275	0.0100
L010	010	930	CONDUIT	90.0	1.8892	0.0160
L010_OF	010	930	CONDUIT	90.0	1.8892	0.0200
L015	015	001	CONDUIT	877.0	1.6981	0.0400
L019	005	001	CONDUIT	885.0	0.8577	0.0400
L045_OF	045	950	CONDUIT	10.0	-0.3000	0.0100
L100	100	950	CONDUIT	1526.0	0.7136	0.0400
L105	105	950	CONDUIT	376.0	2.0456	0.0400
L110	110	105	CONDUIT	2369.0	0.4939	0.0400
917	917	PH	CONDUIT	1126.0	1.4122	0.0400
L120	120	928	CONDUIT	50.0	2.0004	0.0160
L120_OF	120	928	CONDUIT	50.0	2.0004	0.0200
L125	125	130	CONDUIT	636.0	0.7878	0.0400
L130	130	929	CONDUIT	50.0	0.4200	0.0160
L130_OF	130	917	CONDUIT	820.0	0.4744	0.0400
L135	135	920	CONDUIT	2814.0	28.3691	0.0400
L140	140	920	CONDUIT	2733.0	1.1417	0.0400
L145	145	920	CONDUIT	4036.0	0.8499	0.0400
L205	205	926	CONDUIT	200.0	3.5021	0.0200
L206	206	010	CONDUIT	330.0	0.6394	0.0400
L900	900	901	CONDUIT	288.0	1.0695	0.0400
L901	901	931	CONDUIT	75.0	0.8400	0.0160
L901_OF	901	931	CONDUIT	70.0	0.9000	0.0200
L902	902	916	CONDUIT	173.0	2.0756	0.0400
L903	903	LT020	CONDUIT	559.0	0.7710	0.0400
L905	905	001	CONDUIT	1205.0	0.7859	0.0200
L916	916	905	CONDUIT	100.0	1.4602	0.0160
L916_OF	916	905	CONDUIT	100.0	1.4602	0.0200
L918	918	110	CONDUIT	1968.0	0.6707	0.0400
L920	920	136	CONDUIT	4889.0	0.5727	0.0400
L926	926	001	CONDUIT	1264.0	0.8062	0.0400
L928	928	917	CONDUIT	663.0	0.4238	0.0400
L929	929	120	CONDUIT	444.0	0.1959	0.0400
L930	930	926	CONDUIT	120.0	0.4917	0.0400
L931	931	932	CONDUIT	55.0	0.0182	0.0400
L932	932	902	CONDUIT	160.0	0.1750	0.0220
L932_OF	932	902	CONDUIT	160.0	0.1750	0.0200
L950	950	900	CONDUIT	281.0	0.8826	0.0160
L950_OF	950	900	CONDUIT	234.0	2.7703	0.0200
L951	951	952	CONDUIT	551.0	0.1234	0.0160
L951_OF	951	005	CONDUIT	1022.0	0.9296	0.0200
L952	952	953	CONDUIT	356.0	0.0084	0.0160
L952_OF	952	005	CONDUIT	1241.0	0.8381	0.0200

Table A.14 - Existing Conditions SWMM Input/Output

L953	953	IRR_RETURN	CONDUIT	607.0	0.0692	0.0160
L953_OF	953	005	CONDUIT	1374.0	0.9025	0.0200
Q210	210	944	CONDUIT	55.0	2.4735	0.0160
Q210_OF	210	944	CONDUIT	50.0	2.7210	0.0200
Q225	225	940	CONDUIT	1190.0	1.9735	0.0200
Q225_OF	225	941	CONDUIT	2723.0	1.1202	0.0200
Q919	919	LT015	CONDUIT	115.0	1.9047	0.0160
Q919_OF	919	LT015	CONDUIT	115.0	4.3432	0.0400
Q940	940	943	CONDUIT	673.0	0.2006	0.0120
Q940_OF	940	943	CONDUIT	760.0	0.1776	0.0400
Q941	941	944	CONDUIT	2074.0	0.2247	0.0120
Q941_OF	941	944	CONDUIT	2074.0	0.2247	0.0400
Q942	942	941	CONDUIT	595.0	0.5614	0.0120
Q942_OF	942	941	CONDUIT	595.0	0.5614	0.0400
Q943	943	942	CONDUIT	570.0	0.4088	0.0120
Q943_OF	943	942	CONDUIT	570.0	0.4088	0.0400
Q944	944	945	CONDUIT	680.0	1.8812	0.0160
Q945	945	946	CONDUIT	400.0	0.2825	0.0400
Q946	946	947	CONDUIT	105.0	0.0476	0.0160
Q947	947	919	CONDUIT	40.0	6.8913	0.0400
SPR836	836	SPR010	CONDUIT	110.0	0.0909	0.0150
SPR925	925	SPR005	CONDUIT	110.0	1.8185	0.0160
944_OF	944	945	CONDUIT	650.0	3.5083	0.0350
L137	137	136	CONDUIT	4713.0	0.2334	0.0400
L136	136	130	CONDUIT	3443.0	0.7613	0.0400
L115	115	116	CONDUIT	2133.0	2.7577	0.0400
L116	116	917	CONDUIT	1700.0	0.0176	0.0400
L117	117	917	CONDUIT	1832.0	1.6432	0.0400
47	101	102	CONDUIT	400.0	0.9725	0.0100
48	102	100	CONDUIT	3717.0	0.7614	0.0250
PH_Weir	PH	918	WEIR			
Centennial_Out	Centennial	CL_Outlet	OUTLET			
CF_OUT	CF	923	OUTLET			
EL_OUT	Ehrlich	959	OUTLET			
SV_S_Outlet	SV_S	925	OUTLET			

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Cross Section Summary
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Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
CE001	CIRCULAR	4.50	15.90	1.13	4.50	2	124.01
CE001_OF	TRAPEZOIDAL	6.00	2436.00	5.84	412.00	1	22514.55
CE405	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE415	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE500	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE505	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE510	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE600	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE625	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE630	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE635	TRAPEZOIDAL	5.00	400.00	3.07	130.00	1	5097.10
CE640	TRAPEZOIDAL	5.00	400.00	3.07	130.00	1	6103.04
CE650	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE655	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE660	TRAPEZOIDAL	5.00	175.00	2.87	60.00	1	2065.08
CE665	TRAPEZOIDAL	5.00	400.00	3.07	130.00	1	20865.17
CE675	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE803	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE804	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE805	TRAPEZOIDAL	5.00	110.00	2.54	42.00	1	1494.25
CE806	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE807	TRAPEZOIDAL	5.00	175.00	2.87	60.00	1	1149.69
CE808	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE809	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE810	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE811	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE813	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE814	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE815	TRAPEZOIDAL	5.00	175.00	2.87	60.00	1	1506.08
CE818	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE821	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE824	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE825	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE834	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE835	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE837	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE838	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE910	TRAPEZOIDAL	5.00	175.00	2.87	60.00	1	1185.41
CE911	TRAPEZOIDAL	5.00	200.00	2.82	70.00	1	1705.21
CE915	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	881.28
CL_Out	CIRCULAR	1.50	1.77	0.38	1.50	1	8.28
CL_Spill	TRAPEZOIDAL	1.00	135.00	0.57	235.00	1	1168.76
D020	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D025	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D030	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D040	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D200	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D215	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D220	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D325	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D330	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D335	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D340	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D345	DUMMY	0.00	0.00	0.00	0.00	1	0.00
E110_OF	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	2896.57
E300	DUMMY	0.00	0.00	0.00	0.00	1	0.00
E305	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	7321.41
E310	CIRCULAR	4.00	12.57	1.00	4.00	1	44.01
E310_OF	TRAPEZOIDAL	3.00	510.00	1.59	320.00	1	4569.30
E320	TRAPEZOIDAL	4.00	1680.00	2.05	820.00	1	58894.70
E350	TRAPEZOIDAL	5.00	550.00	2.62	210.00	1	6417.55
E355	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	4536.19
E360	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	7349.85
E904	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	14276.13
E906	TRAPEZOIDAL	5.00	175.00	2.87	60.00	1	3675.26
E922	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	5087.80
E923	HORIZ_ELLIPSE	3.00	11.42	0.92	5.00	1	43.58
E923_OF	TRAPEZOIDAL	1.00	70.00	0.58	120.00	1	187.62
E927	TRAPEZOIDAL	10.00	450.00	5.15	85.00	1	1273.88
E933	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	5936.68
E934	CIRCULAR	5.00	19.63	1.25	5.00	1	116.70
E934_OF	TRAPEZOIDAL	3.00	510.00	1.59	320.00	1	3563.76
E935	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	9055.03
E936	CIRCULAR	4.50	15.90	1.13	4.50	1	183.93
E936_OF	TRAPEZOIDAL	3.00	510.00	1.59	320.00	1	3967.23
E937	TRAPEZOIDAL	10.00	500.00	5.41	90.00	1	5674.80
E938	CIRCULAR	4.00	12.57	1.00	4.00	1	187.01
E938_OF	TRAPEZOIDAL	3.00	510.00	1.59	320.00	1	5522.26
E939	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	6875.39
E948	CIRCULAR	4.00	12.57	1.00	4.00	1	114.75
E948_OF	TRAPEZOIDAL	5.00	550.00	2.62	210.00	1	3814.06

Table A.14 - Existing Conditions SWMM Input/Output

E956	TRAPEZOIDAL	5.00	2600.00	2.55	1020.00	1	53472.11
E957	HORIZ_ELLIPSE	3.00	11.42	0.92	5.00	2	64.18
E957_OF	TRAPEZOIDAL	2.00	220.00	1.05	210.00	1	1079.49
E958	CIRCULAR	4.00	12.57	1.00	4.00	1	85.67
E959	CIRCULAR	4.00	12.57	1.00	4.00	1	51.50
E959_OF	TRAPEZOIDAL	2.00	240.00	1.09	220.00	1	1546.60
E960	CIRCULAR	4.00	12.57	1.00	4.00	1	73.51
Eh_In	DUMMY	0.00	0.00	0.00	0.00	1	0.00
L010	CIRCULAR	1.50	1.77	0.38	1.50	1	11.73
L010_OF	TRAPEZOIDAL	1.00	70.00	0.58	120.00	1	499.03
L015	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	4753.51
L019	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	3378.26
L045_OF	DUMMY	0.00	0.00	0.00	0.00	1	0.00
L100	TRAPEZOIDAL	5.00	110.00	2.54	42.00	1	643.42
L105	TRAPEZOIDAL	5.00	110.00	2.54	42.00	1	1089.34
L110	TRAPEZOIDAL	2.50	16.25	1.47	9.00	1	54.79
917	DUMMY	0.00	0.00	0.00	0.00	1	0.00
L120	CIRCULAR	3.50	9.62	0.88	3.50	1	115.62
L120_OF	TRAPEZOIDAL	1.00	70.00	0.58	120.00	1	513.50
L125	DUMMY	0.00	0.00	0.00	0.00	1	0.00
L130	CIRCULAR	2.00	3.14	0.50	2.00	1	11.91
L130_OF	TRAPEZOIDAL	5.00	550.00	2.62	210.00	1	2671.84
L135	TRAPEZOIDAL	10.00	1000.00	6.58	150.00	1	69479.48
L140	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	3897.69
L145	TRAPEZOIDAL	5.00	500.00	3.32	150.00	1	3812.70
L205	TRAPEZOIDAL	2.00	100.00	1.11	90.00	1	1490.53
L206	TRAPEZOIDAL	3.00	150.00	1.58	95.00	1	603.36
L900	CE900	6.00	258.00	2.27	112.00	1	1713.05
L901	HORIZ_ELLIPSE	3.67	17.09	1.12	5.50	2	157.25
L901_OF	TRAPEZOIDAL	5.00	750.00	3.00	250.00	1	10989.34
L902	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	9833.03
L903	TRAPEZOIDAL	5.00	200.00	3.27	60.00	1	1436.26
L905	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	6467.76
L916	HORIZ_ELLIPSE	3.60	16.45	1.10	5.70	2	196.94
L916_OF	TRAPEZOIDAL	1.00	70.00	0.58	120.00	1	438.72
L918	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	2987.55
L920	TRAPEZOIDAL	5.00	475.00	2.79	170.00	1	2645.36
L926	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	3275.34
L928	TRAPEZOIDAL	5.00	362.50	2.67	135.00	1	1688.58
L929	TRAPEZOIDAL	5.00	110.00	2.54	42.00	1	337.15
L930	TRAPEZOIDAL	2.00	50.00	1.11	45.00	1	139.31
L931	TRAPEZOIDAL	20.00	1800.00	10.29	170.00	1	4265.78
L932	RECT_OPEN	3.00	30.00	1.88	10.00	1	128.90
L932_OF	TRAPEZOIDAL	2.00	240.00	1.09	220.00	1	790.42
L950	CIRCULAR	4.50	15.90	1.13	4.50	2	150.11
L950_OF	TRAPEZOIDAL	5.00	600.00	2.72	220.00	1	14473.05
L951	CIRCULAR	2.00	3.14	0.50	2.00	1	6.46
L951_OF	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	7034.15
L952	CIRCULAR	2.00	3.14	0.50	2.00	1	1.69
L952_OF	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	6678.89
L953	CIRCULAR	2.00	3.14	0.50	2.00	1	4.83
L953_OF	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	6930.94
Q210	CIRCULAR	2.00	3.14	0.50	2.00	1	28.91
Q210_OF	TRAPEZOIDAL	1.00	60.00	0.55	110.00	1	490.86
Q225	TRAPEZOIDAL	2.50	137.50	1.31	105.00	1	1716.49
Q225_OF	TRAPEZOIDAL	2.50	137.50	1.31	105.00	1	1293.19
Q919	CIRCULAR	4.00	12.57	1.00	4.00	2	161.07
Q919_OF	TRAPEZOIDAL	1.00	150.00	0.60	250.00	1	826.12
Q940	CIRCULAR	2.50	4.91	0.63	2.50	1	19.90
Q940_OF	TRAPEZOIDAL	5.00	150.00	2.93	50.00	1	480.67
Q941	CIRCULAR	5.00	19.63	1.25	5.00	1	133.74
Q941_OF	TRAPEZOIDAL	5.00	110.00	2.54	42.00	1	361.03
Q942	CIRCULAR	4.00	12.57	1.00	4.00	1	116.59
Q942_OF	TRAPEZOIDAL	5.00	150.00	2.93	50.00	1	854.49
Q943	CIRCULAR	3.00	7.07	0.75	3.00	1	46.20
Q943_OF	TRAPEZOIDAL	5.00	150.00	2.93	50.00	1	729.17
Q944	HORIZ_ELLIPSE	4.00	20.31	1.22	6.33	1	296.06
Q945	TRAPEZOIDAL	5.00	150.00	2.93	50.00	1	606.18
Q946	RECT_CLOSED	6.00	60.00	1.88	10.00	2	184.90
Q947	TRAPEZOIDAL	5.00	150.00	2.93	50.00	1	2993.91
SPR836	DUMMY	0.00	0.00	0.00	0.00	1	0.00
SPR925	CIRCULAR	3.00	7.07	0.75	3.00	1	73.08
944_OF	TRAPEZOIDAL	2.00	26.00	1.21	21.00	1	234.75
L137	TRAPEZOIDAL	10.00	1000.00	6.58	150.00	1	6302.05
L136	TRAPEZOIDAL	10.00	1000.00	6.58	150.00	1	11381.65
L115	TRAPEZOIDAL	10.00	1100.00	5.21	210.00	1	20403.48
L116	TRAPEZOIDAL	10.00	700.00	5.74	120.00	1	1107.30
L117	TRAPEZOIDAL	10.00	500.00	5.41	90.00	1	7335.83
47	TRAPEZOIDAL	2.00	12.00	1.10	10.00	1	186.99
48	TRAPEZOIDAL	1.50	57.00	1.02	56.00	1	298.70

****
Transect Summary
****

Transect CE900
Area:

0.0049	0.0102	0.0160	0.0222	0.0288
0.0359	0.0435	0.0515	0.0599	0.0688
0.0782	0.0880	0.0982	0.1089	0.1200
0.1316	0.1436	0.1561	0.1690	0.1823
0.1961	0.2104	0.2251	0.2402	0.2558
0.2719	0.2883	0.3053	0.3226	0.3405
0.3587	0.3775	0.3966	0.4166	0.4384
0.4621	0.4879	0.5155	0.5452	0.5767
0.6103	0.6458	0.6832	0.7226	0.7640
0.8073	0.8525	0.8997	0.9489	1.0000

Hrad:

0.0502	0.0963	0.1392	0.1797	0.2182
0.2551	0.2906	0.3251	0.3586	0.3913
0.4234	0.4548	0.4857	0.5162	0.5463
0.5761	0.6055	0.6346	0.6635	0.6922
0.7207	0.7490	0.7771	0.8050	0.8329
0.8606	0.8882	0.9156	0.9430	0.9703
0.9975	1.0246	1.0516	1.0289	0.9917
0.9643	0.9447	0.9312	0.9227	0.9183
0.9174	0.9193	0.9237	0.9302	0.9385
0.9484	0.9596	0.9720	0.9855	1.0000

Width:

0.0979	0.1064	0.1150	0.1236	0.1321
0.1407	0.1493	0.1579	0.1664	0.1750
0.1836	0.1921	0.2007	0.2093	0.2179
0.2264	0.2350	0.2436	0.2521	0.2607
0.2693	0.2779	0.2864	0.2950	0.3036
0.3121	0.3207	0.3293	0.3379	0.3464
0.3550	0.3636	0.3721	0.4000	0.4375
0.4750	0.5125	0.5500	0.5875	0.6250
0.6625	0.7000	0.7375	0.7750	0.8125
0.8500	0.8875	0.9250	0.9625	1.0000

********** Volume Volume

Table A.14 - Existing Conditions SWMM Input/Output

```
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.000         0.000
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........      1604.594       522.881
External Outflow .........      1406.316       458.269
Internal Outflow .........         0.000         0.000
Storage Losses ...........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......       213.493        69.570
Continuity Error (%) .....        -0.948


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     5.00 sec
Average Time Step           :     5.00 sec
Maximum Time Step           :     5.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     1.00


******************
Node Depth Summary
******************

-------------------------------------------------------------------
                              Average  Maximum  Maximum  Time of Max
                                Depth    Depth      HGL   Occurrence
Node                 Type        Feet     Feet     Feet  days hr:min
-------------------------------------------------------------------
005                  JUNCTION    2.07     3.53  4742.93     0  00:40
015                  JUNCTION    2.53     3.07  4749.27     0  00:40
020                  JUNCTION    0.00     0.00  4744.71     0  00:00
025                  JUNCTION    0.00     0.00  4742.88     0  00:00
030                  JUNCTION    0.00     0.00  4742.20     0  00:00
040                  JUNCTION    0.00     0.00  4742.17     0  00:00
045                  JUNCTION    0.00     0.00  4752.78     0  00:00
100                  JUNCTION    0.26     2.94  4766.64     0  00:54
101                  JUNCTION    0.05     0.72  4796.61     0  00:45
102                  JUNCTION    0.05     0.72  4792.72     0  00:46
105                  JUNCTION    1.11     2.50  4763.00     0  00:42
115                  JUNCTION    0.05     0.79  4857.79     0  00:45
116                  JUNCTION    0.28     4.29  4802.49     0  00:50
117                  JUNCTION    0.08     1.62  4829.62     0  00:45
125                  JUNCTION    0.00     0.00  4806.80     0  00:00
135                  JUNCTION    0.04     0.55  5624.55     0  00:55
136                  JUNCTION    0.48     3.65  4831.65     0  01:25
137                  JUNCTION    0.16     2.29  4841.29     0  00:55
140                  JUNCTION    0.25     2.19  4889.39     0  01:10
145                  JUNCTION    0.15     1.36  4891.66     0  01:10
200                  JUNCTION    0.00     0.00  4766.52     0  00:00
205                  JUNCTION    0.01     0.21  4751.21     0  00:40
206                  JUNCTION    0.03     0.56  4748.96     0  00:40
215                  JUNCTION    0.00     0.00  4771.20     0  00:00
220                  JUNCTION    0.00     0.00  4775.70     0  00:00
300                  JUNCTION    1.28     4.49  4726.09     0  03:01
305                  JUNCTION    0.03     0.78  4738.48     0  00:35
320                  JUNCTION    0.01     0.26  4750.66     0  00:40
325                  JUNCTION    0.00     0.00  4751.00     0  00:00
330                  JUNCTION    0.00     0.00  4754.50     0  00:00
335                  JUNCTION    0.00     0.00  4745.97     0  00:00
340                  JUNCTION    0.00     0.00  4758.20     0  00:00
345                  JUNCTION    0.00     0.00  4766.50     0  00:00
350                  JUNCTION    0.04     0.86  4768.66     0  00:40
355                  JUNCTION    0.28     2.99  4789.99     0  01:05
360                  JUNCTION    0.31     3.08  4782.88     0  01:03
405                  JUNCTION    0.00     0.00  4725.10     0  00:00
415                  JUNCTION    0.00     0.00  4731.50     0  00:00
500                  JUNCTION    0.00     0.00  4772.80     0  00:00
505                  JUNCTION    0.00     0.00  4779.10     0  00:00
510                  JUNCTION    0.00     0.00  4784.10     0  00:00
600                  JUNCTION    0.00     0.00  4738.50     0  00:00
625                  JUNCTION    0.00     0.00  4794.60     0  00:00
630                  JUNCTION    0.10     1.39  4805.19     0  00:57
635                  JUNCTION    0.10     1.39  4861.19     0  00:55
640                  JUNCTION    0.02     0.34  4909.04     0  00:45
650                  JUNCTION    0.00     0.00  4773.50     0  00:00
655                  JUNCTION    0.57     4.78  4784.08     0  01:12
660                  JUNCTION    0.14     1.99  4797.09     0  00:50
665                  JUNCTION    0.03     0.39  4861.69     0  00:55
675                  JUNCTION    0.00     0.00  4800.50     0  00:00
803                  JUNCTION    0.00     0.00  4777.50     0  00:00
804                  JUNCTION    0.28     2.69  4714.79     0  01:11
805                  JUNCTION    0.34     2.46  4779.76     0  01:10
806                  JUNCTION    0.00     0.00  4734.50     0  00:00
807                  JUNCTION    0.26     2.70  4735.80     0  01:05
808                  JUNCTION    0.00     0.00  4725.40     0  00:00
809                  JUNCTION    0.00     0.00  4724.50     0  00:00
810                  JUNCTION    0.00     0.00  4721.80     0  00:00
811                  JUNCTION    0.37     2.84  4715.74     0  01:21
812                  JUNCTION    0.35     2.85  4761.85     0  01:10
813                  JUNCTION    0.00     0.00  4760.50     0  00:00
814                  JUNCTION    0.00     0.00  4729.80     0  00:00
815                  JUNCTION    0.36     3.00  4773.10     0  01:15
818                  JUNCTION    0.38     2.98  4719.08     0  01:22
821                  JUNCTION    0.00     0.00  4765.10     0  00:00
824                  JUNCTION    0.00     0.00  4731.90     0  00:00
825                  JUNCTION    0.00     0.00  4738.10     0  00:00
834                  JUNCTION    0.00     0.00  4734.00     0  00:00
835                  JUNCTION    0.00     0.00  4715.60     0  00:00
836                  JUNCTION    0.00     0.00  4736.90     0  00:00
837                  JUNCTION    0.00     0.00  4727.10     0  00:00
838                  JUNCTION    0.00     0.00  4724.60     0  00:00
900                  JUNCTION    0.77     4.07  4754.40     0  00:56
902                  JUNCTION    3.36     4.57  4750.90     0  00:59
903                  JUNCTION    6.02     6.58  4739.89     0  00:55
904                  JUNCTION    1.97     3.66  4740.86     0  02:56
905                  JUNCTION    4.01     4.44  4747.72     0  00:58
906                  JUNCTION    0.49     3.15  4752.89     0  02:55
910                  JUNCTION    0.56     4.78  4792.78     0  01:10
915                  JUNCTION    0.93     0.95  4726.25     0  01:13
917                  JUNCTION    0.70     4.46  4802.36     0  01:31
918                  JUNCTION    0.72     3.64  4789.04     0  02:18
920                  JUNCTION    0.41     3.39  4859.39     0  01:16
```

Table A.14 - Existing Conditions SWMM Input/Output

922	JUNCTION	0.98	3.72	4760.12	0	01:07
925	JUNCTION	0.47	0.58	4740.48	0	01:12
926	JUNCTION	0.05	1.05	4745.05	0	00:37
927	JUNCTION	5.34	8.06	4753.62	0	01:08
928	JUNCTION	0.47	3.50	4804.21	0	00:34
929	JUNCTION	1.57	2.31	4803.89	0	07:05
930	JUNCTION	3.00	3.21	4747.80	0	00:36
931	JUNCTION	4.66	7.55	4754.17	0	00:57
933	JUNCTION	8.36	9.81	4739.59	0	02:57
935	JUNCTION	2.96	5.00	4731.81	0	00:33
937	JUNCTION	7.16	8.84	4737.63	0	02:58
939	JUNCTION	7.14	8.60	4742.23	0	02:56
945	JUNCTION	0.40	3.80	4748.25	0	01:24
946	JUNCTION	0.42	4.39	4747.71	0	01:25
947	JUNCTION	0.39	4.38	4747.65	0	01:25
949	JUNCTION	7.17	9.41	4750.77	0	01:17
956	JUNCTION	0.56	3.63	4754.63	0	02:35
958	JUNCTION	2.09	2.65	4744.78	0	01:48
960	JUNCTION	3.11	4.00	4747.32	0	01:48
BT001	OUTFALL	0.00	0.00	4779.20	0	00:00
BT005	OUTFALL	0.00	0.00	4773.40	0	00:00
BT010	OUTFALL	0.00	0.00	4794.50	0	00:00
BT015	OUTFALL	0.00	0.00	4738.40	0	00:00
BT020	OUTFALL	0.00	0.00	4738.00	0	00:00
BT025	OUTFALL	0.00	0.00	4731.80	0	00:00
BT030	OUTFALL	0.00	0.00	4765.00	0	00:00
BT035	OUTFALL	0.00	0.00	4721.50	0	00:00
BT040	OUTFALL	0.00	0.00	4716.00	0	00:00
BT045	OUTFALL	0.00	0.00	4729.70	0	00:00
BT046	OUTFALL	0.00	0.00	4724.50	0	00:00
BT047	OUTFALL	0.00	0.00	4727.00	0	00:00
BT055	OUTFALL	0.46	0.47	4715.97	0	02:44
BT060	OUTFALL	0.00	0.00	4712.80	0	00:00
BT065	OUTFALL	0.00	0.00	4721.70	0	00:00
BT070	OUTFALL	0.00	0.00	4724.40	0	00:00
BT075	OUTFALL	0.00	0.00	4725.30	0	00:00
BT080	OUTFALL	0.00	0.00	4712.10	0	00:00
BT085	OUTFALL	0.35	2.46	4687.26	0	01:16
LT001	OUTFALL	0.00	0.00	4752.60	0	00:00
LT005	OUTFALL	0.00	0.00	4741.00	0	00:00
LT010	OUTFALL	0.00	0.00	4740.20	0	00:00
LT015	OUTFALL	5.00	5.00	4743.33	0	00:00
LT020	OUTFALL	0.53	3.48	4732.48	0	00:56
SPR001	OUTFALL	0.00	0.00	4731.60	0	00:00
SPR005	OUTFALL	0.47	0.58	4738.48	0	03:58
SPR010	OUTFALL	0.00	0.00	4736.80	0	00:00
IRR_RETURN	OUTFALL	0.16	2.00	4743.75	0	00:28
001	DIVIDER	6.02	6.59	4740.40	0	00:55
010	DIVIDER	3.00	3.21	4749.50	0	00:36
951	DIVIDER	6.03	6.51	4749.39	0	00:35
952	DIVIDER	7.63	8.29	4750.49	0	00:40
953	DIVIDER	9.64	9.98	4752.15	0	00:35
110	DIVIDER	1.67	4.65	4776.85	0	02:23
120	DIVIDER	0.67	3.50	4805.21	0	00:33
130	DIVIDER	0.96	4.46	4806.25	0	01:29
210	DIVIDER	0.09	2.00	4760.60	0	00:31
225	DIVIDER	0.09	0.83	4793.23	0	01:05
310	DIVIDER	8.36	9.81	4739.99	0	02:57
901	DIVIDER	4.56	4.84	4752.09	0	00:57
916	DIVIDER	4.01	4.44	4749.18	0	00:57
919	DIVIDER	7.80	7.80	4748.32	0	00:00
923	DIVIDER	4.00	4.43	4761.69	0	01:23
932	DIVIDER	3.52	7.55	4754.16	0	00:58
934	DIVIDER	2.97	5.43	4733.63	0	02:58
936	DIVIDER	7.16	8.84	4738.16	0	02:58
938	DIVIDER	7.14	8.60	4743.00	0	02:56
940	DIVIDER	3.13	4.94	4773.86	0	01:10
941	DIVIDER	3.75	6.98	4768.88	0	01:04
942	DIVIDER	3.10	4.86	4770.10	0	01:09
943	DIVIDER	3.14	4.94	4772.51	0	01:14
948	DIVIDER	7.17	9.42	4753.97	0	01:17
CL_Outlet	DIVIDER	11.20	11.20	4742.90	0	00:00
950	DIVIDER	4.01	4.50	4757.31	0	00:45
957	DIVIDER	5.31	6.80	4752.77	0	01:08
959	DIVIDER	7.05	8.59	4752.28	0	02:54
944	DIVIDER	10.00	10.38	4767.62	0	01:16
Centennial	STORAGE	4.06	4.74	4729.74	0	02:28
CF	STORAGE	3.19	5.51	4765.51	0	01:23
Ehrlich	STORAGE	8.44	11.95	4751.95	0	02:54
PH	STORAGE	10.46	14.27	4796.27	0	02:18
SV_S	STORAGE	1.09	1.60	4732.60	0	02:07

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Node Inflow Summary
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Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal
005	JUNCTION	92.49	164.51	0 00:40	1.637	2.945
015	JUNCTION	21.58	21.58	0 00:40	0.479	0.479
020	JUNCTION	104.71	104.71	0 00:40	2.075	2.075
025	JUNCTION	29.32	29.32	0 00:35	0.414	0.414
030	JUNCTION	42.26	42.26	0 00:40	0.834	0.834
040	JUNCTION	13.83	13.83	0 00:35	0.267	0.267
045	JUNCTION	36.28	36.28	0 00:45	0.931	0.931
100	JUNCTION	140.98	168.83	0 00:54	4.059	5.610
101	JUNCTION	22.01	22.01	0 00:45	0.690	0.690
102	JUNCTION	24.53	46.47	0 00:50	0.803	1.494
105	JUNCTION	83.81	138.60	0 00:55	3.042	15.841
115	JUNCTION	58.56	58.56	0 00:45	1.664	1.664
116	JUNCTION	118.40	173.87	0 00:50	3.441	5.122
117	JUNCTION	138.31	138.31	0 00:45	3.343	3.343
125	JUNCTION	357.62	357.62	0 01:15	20.150	20.150
135	JUNCTION	371.76	371.76	0 00:55	11.997	11.997
136	JUNCTION	362.81	1626.64	0 01:25	14.109	78.219
137	JUNCTION	390.13	390.13	0 00:55	12.938	12.938
140	JUNCTION	465.15	465.15	0 01:10	21.154	21.154
145	JUNCTION	321.06	321.06	0 01:10	16.120	16.120
200	JUNCTION	41.77	41.77	0 00:45	1.169	1.169
205	JUNCTION	12.06	12.06	0 00:40	0.244	0.244
206	JUNCTION	10.92	10.92	0 00:40	0.257	0.257
215	JUNCTION	59.15	59.15	0 00:50	1.804	1.804
220	JUNCTION	70.75	70.75	0 00:45	1.934	1.934
300	JUNCTION	39.09	1370.68	0 03:01	2.022	100.981
305	JUNCTION	68.66	68.66	0 00:35	1.079	1.079
320	JUNCTION	76.03	76.03	0 00:40	1.778	1.778
325	JUNCTION	167.57	167.57	0 01:00	6.304	6.304
330	JUNCTION	383.83	383.83	0 00:35	4.904	4.904
335	JUNCTION	279.06	279.06	0 00:55	9.168	9.168

Table A.14 - Existing Conditions SWMM Input/Output

340	JUNCTION	20.75	20.75	0	00:50	0.701	0.701
345	JUNCTION	105.77	105.77	0	00:40	1.988	1.988
350	JUNCTION	93.78	93.78	0	00:40	1.891	1.891
355	JUNCTION	277.58	277.58	0	01:05	11.474	11.474
360	JUNCTION	224.65	477.77	0	01:03	7.079	18.588
405	JUNCTION	695.99	695.99	0	00:35	10.812	10.812
415	JUNCTION	328.52	328.52	0	00:35	4.485	4.485
500	JUNCTION	42.53	42.53	0	00:40	0.894	0.894
505	JUNCTION	93.10	93.10	0	01:00	3.608	3.608
510	JUNCTION	58.23	58.23	0	01:00	2.533	2.533
600	JUNCTION	207.65	207.65	0	00:50	6.639	6.639
625	JUNCTION	156.23	731.01	0	00:53	4.822	23.141
630	JUNCTION	201.28	580.47	0	00:56	4.587	18.319
635	JUNCTION	382.75	382.75	0	00:55	12.705	12.705
640	JUNCTION	37.78	37.78	0	00:45	0.949	0.949
650	JUNCTION	100.96	100.96	0	00:40	2.144	2.144
655	JUNCTION	58.54	1109.49	0	01:12	1.518	52.842
660	JUNCTION	135.63	277.99	0	00:50	3.160	8.399
665	JUNCTION	159.00	159.00	0	00:55	5.229	5.229
675	JUNCTION	857.42	857.42	0	01:15	42.919	42.919
803	JUNCTION	133.57	133.57	0	01:15	7.793	7.793
804	JUNCTION	237.04	431.03	0	01:02	4.567	17.112
805	JUNCTION	122.31	253.51	0	01:10	5.923	13.717
806	JUNCTION	153.66	153.66	0	01:05	6.398	6.398
807	JUNCTION	139.53	293.19	0	01:05	6.072	12.469
808	JUNCTION	370.71	370.71	0	01:05	15.181	15.181
809	JUNCTION	536.72	536.72	0	01:10	24.623	24.623
810	JUNCTION	605.20	605.20	0	01:20	32.476	32.476
811	JUNCTION	195.20	606.07	0	01:13	5.452	30.220
812	JUNCTION	134.19	474.63	0	01:10	5.900	24.678
813	JUNCTION	348.77	348.77	0	01:15	18.777	18.777
814	JUNCTION	225.13	225.13	0	00:45	5.824	5.824
815	JUNCTION	480.26	480.26	0	01:15	24.537	24.537
818	JUNCTION	415.46	886.73	0	01:20	22.351	46.996
821	JUNCTION	211.41	211.41	0	00:50	6.513	6.513
824	JUNCTION	198.21	198.21	0	01:05	8.499	8.499
825	JUNCTION	157.42	157.42	0	00:55	5.285	5.285
834	JUNCTION	119.66	119.66	0	00:45	2.985	2.985
835	JUNCTION	199.63	199.63	0	00:40	3.847	3.847
836	JUNCTION	52.85	52.85	0	00:55	1.976	1.976
837	JUNCTION	35.40	35.40	0	00:40	0.738	0.738
838	JUNCTION	129.01	129.01	0	00:30	1.466	1.466
900	JUNCTION	0.00	359.33	0	00:56	0.000	22.572
902	JUNCTION	0.00	396.19	0	00:59	0.000	22.850
903	JUNCTION	0.00	707.12	0	00:55	0.000	30.478
904	JUNCTION	0.00	1360.37	0	02:56	0.000	94.771
905	JUNCTION	0.00	494.45	0	00:54	0.000	24.985
906	JUNCTION	0.00	1308.94	0	02:55	0.000	68.188
910	JUNCTION	0.00	1070.44	0	01:10	0.000	51.318
915	JUNCTION	0.00	6.00	0	01:13	0.000	3.782
917	JUNCTION	0.00	2276.86	0	01:28	0.000	114.959
918	JUNCTION	0.00	1315.02	0	02:18	0.000	76.632
920	JUNCTION	0.00	1060.82	0	01:16	0.000	49.642
922	JUNCTION	0.00	501.36	0	01:07	0.000	23.228
925	JUNCTION	0.00	6.00	0	01:12	0.000	2.605
926	JUNCTION	0.00	42.98	0	00:37	0.000	0.827
927	JUNCTION	0.00	742.61	0	01:08	0.000	32.424
928	JUNCTION	0.00	161.03	0	00:45	0.000	6.560
929	JUNCTION	0.00	12.80	0	07:05	0.000	2.644
930	JUNCTION	0.00	30.95	0	00:36	0.000	0.583
931	JUNCTION	0.00	396.31	0	00:57	0.000	22.847
933	JUNCTION	0.00	1360.30	0	02:57	0.000	97.979
935	JUNCTION	0.00	1360.19	0	02:59	0.000	97.949
937	JUNCTION	0.00	1360.24	0	02:58	0.000	97.966
939	JUNCTION	0.00	1360.35	0	02:56	0.000	94.766
945	JUNCTION	0.00	331.87	0	01:24	0.000	13.906
946	JUNCTION	0.00	313.44	0	01:25	0.000	13.908
947	JUNCTION	0.00	312.49	0	01:25	0.000	13.908
949	JUNCTION	0.00	733.35	0	01:17	0.000	32.549
956	JUNCTION	0.00	1297.28	0	02:34	0.000	74.584
958	JUNCTION	0.00	57.00	0	01:48	0.000	26.608
960	JUNCTION	0.00	55.71	0	01:48	0.000	26.618
BT001	OUTFALL	0.00	1109.49	0	01:12	0.000	52.842
BT005	OUTFALL	0.00	100.96	0	00:40	0.000	2.144
BT010	OUTFALL	0.00	731.01	0	00:53	0.000	23.141
BT015	OUTFALL	0.00	207.65	0	00:50	0.000	6.639
BT020	OUTFALL	0.00	157.42	0	00:55	0.000	5.285
BT025	OUTFALL	0.00	198.21	0	01:05	0.000	8.499
BT030	OUTFALL	0.00	211.41	0	00:50	0.000	6.513
BT035	OUTFALL	0.00	1370.68	0	03:01	0.000	100.981
BT040	OUTFALL	0.00	886.73	0	01:20	0.000	46.996
BT045	OUTFALL	0.00	225.13	0	00:45	0.000	5.824
BT046	OUTFALL	0.00	129.01	0	00:30	0.000	1.466
BT047	OUTFALL	0.00	35.40	0	00:40	0.000	0.738
BT055	OUTFALL	0.00	200.42	0	00:40	0.000	7.605
BT060	OUTFALL	0.00	606.07	0	01:13	0.000	30.220
BT065	OUTFALL	0.00	605.20	0	01:20	0.000	32.476
BT070	OUTFALL	0.00	536.72	0	01:10	0.000	24.623
BT075	OUTFALL	0.00	370.71	0	01:05	0.000	15.181
BT080	OUTFALL	0.00	431.03	0	01:02	0.000	17.112
BT085	OUTFALL	0.00	253.50	0	01:16	0.000	13.727
LT001	OUTFALL	0.00	58.23	0	01:00	0.000	2.533
LT005	OUTFALL	0.00	93.10	0	01:00	0.000	3.608
LT010	OUTFALL	0.00	42.53	0	00:40	0.000	0.894
LT015	OUTFALL	0.00	312.36	0	01:25	0.000	13.906
LT020	OUTFALL	0.00	696.53	0	00:56	0.000	30.476
SPR001	OUTFALL	0.00	0.00	0	00:00	0.000	0.000
SPR005	OUTFALL	0.00	6.00	0	03:58	0.000	2.605
SPR010	OUTFALL	0.00	52.85	0	00:55	0.000	1.976
IRR_RETURN	OUTFALL	0.00	5.23	0	01:26	0.000	0.227
001	DIVIDER	62.67	720.05	0	00:55	1.214	30.466
010	DIVIDER	23.05	30.95	0	00:36	0.325	0.583
951	DIVIDER	0.00	29.32	0	00:35	0.000	0.414
952	DIVIDER	0.00	48.71	0	00:40	0.000	1.041
953	DIVIDER	0.00	15.51	0	00:35	0.000	0.372
110	DIVIDER	112.45	1332.76	0	02:23	3.674	80.506
120	DIVIDER	149.16	161.07	0	00:45	3.909	6.555
130	DIVIDER	92.62	2014.06	0	01:29	3.579	102.168
210	DIVIDER	42.99	42.99	0	00:40	0.894	0.894
225	DIVIDER	169.88	169.88	0	01:05	7.885	7.885
310	DIVIDER	210.03	1360.31	0	02:57	3.230	97.977
901	DIVIDER	0.00	359.27	0	00:57	0.000	22.571
916	DIVIDER	0.00	466.73	0	00:57	0.000	24.924
919	DIVIDER	0.00	312.44	0	01:25	0.000	13.908
923	DIVIDER	0.00	73.67	0	01:23	0.000	4.577
932	DIVIDER	0.00	396.27	0	00:58	0.000	22.846
934	DIVIDER	0.00	1360.20	0	02:58	0.000	97.945
936	DIVIDER	0.00	1360.25	0	02:58	0.000	97.956
938	DIVIDER	0.00	1360.35	0	02:56	0.000	94.757
940	DIVIDER	0.00	84.88	0	01:10	0.000	3.944
941	DIVIDER	0.00	268.20	0	01:04	0.000	11.700
942	DIVIDER	0.00	136.56	0	01:09	0.000	5.908
943	DIVIDER	0.00	136.63	0	01:06	0.000	5.897
948	DIVIDER	0.00	733.46	0	01:17	0.000	32.540

Table A.14 - Existing Conditions SWMM Input/Output

CL_Outlet	DIVIDER	0.00	6.00	0	00:39	0.000	3.788
950	DIVIDER	0.00	337.19	0	00:56	0.000	22.387
957	DIVIDER	0.00	742.62	0	01:08	0.000	32.418
959	DIVIDER	0.00	1360.53	0	02:54	0.000	94.807
944	DIVIDER	0.00	305.11	0	01:16	0.000	13.880
Centennial	STORAGE	0.00	805.06	0	00:40	0.000	13.798
CF	STORAGE	0.00	192.35	0	00:41	0.000	3.882
Ehrlich	STORAGE	0.00	1549.46	0	02:31	0.000	113.813
PH	STORAGE	0.00	2276.86	0	01:28	0.000	114.959
SV_S	STORAGE	0.00	328.52	0	00:35	0.000	4.485

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Node Surcharge Summary
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Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
020	JUNCTION	24.00	0.000	0.000
025	JUNCTION	24.00	0.000	0.000
030	JUNCTION	24.00	0.000	0.000
040	JUNCTION	24.00	0.000	0.000
045	JUNCTION	24.00	0.000	0.000
125	JUNCTION	24.00	0.000	0.000
200	JUNCTION	24.00	0.000	0.000
215	JUNCTION	24.00	0.000	0.000
220	JUNCTION	24.00	0.000	0.000
325	JUNCTION	24.00	0.000	0.000
330	JUNCTION	24.00	0.000	0.000
335	JUNCTION	24.00	0.000	0.000
340	JUNCTION	24.00	0.000	0.000
345	JUNCTION	24.00	0.000	0.000
405	JUNCTION	24.00	0.000	0.000
415	JUNCTION	24.00	0.000	0.000
500	JUNCTION	24.00	0.000	0.000
505	JUNCTION	24.00	0.000	0.000
510	JUNCTION	24.00	0.000	0.000
600	JUNCTION	24.00	0.000	0.000
625	JUNCTION	24.00	0.000	0.000
650	JUNCTION	24.00	0.000	0.000
675	JUNCTION	24.00	0.000	0.000
803	JUNCTION	24.00	0.000	0.000
806	JUNCTION	24.00	0.000	0.000
808	JUNCTION	24.00	0.000	0.000
809	JUNCTION	24.00	0.000	0.000
810	JUNCTION	24.00	0.000	0.000
813	JUNCTION	24.00	0.000	0.000
814	JUNCTION	24.00	0.000	0.000
821	JUNCTION	24.00	0.000	0.000
824	JUNCTION	24.00	0.000	0.000
825	JUNCTION	24.00	0.000	0.000
834	JUNCTION	24.00	0.000	0.000
835	JUNCTION	24.00	0.000	0.000
836	JUNCTION	24.00	0.000	0.000
837	JUNCTION	24.00	0.000	0.000
838	JUNCTION	24.00	0.000	0.000
960	JUNCTION	12.86	0.000	3.230
210	DIVIDER	0.49	0.000	0.000
Centennial	STORAGE	24.00	4.736	7.264
CF	STORAGE	4.10	0.507	0.013
Ehrlich	STORAGE	22.74	6.950	1.050
SV_S	STORAGE	24.00	1.604	5.396

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Node Flooding Summary
****

No nodes were flooded.

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Storage Volume Summary
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Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
Centennial	1527.787	30	0	1798.701	35	0 02:28	6.00
CF	202.731	48	0	423.792	100	0 01:23	59.23
Ehrlich	3897.641	47	0	6524.759	79	0 02:54	1360.53
PH	5158.861	64	0	7595.264	94	0 02:18	1315.02
SV_S	383.367	15	0	566.864	22	0 02:07	6.00

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Outfall Loading Summary
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Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
BT001	44.42	184.04	1109.49	52.842
BT005	13.11	25.29	100.96	2.144
BT010	38.95	91.92	731.01	23.141
BT015	18.01	57.04	207.65	6.639
BT020	19.07	42.89	157.42	5.285
BT025	23.55	55.85	198.21	8.499
BT030	17.79	56.65	211.41	6.513
BT035	99.18	157.53	1370.68	100.981
BT040	83.87	86.70	886.73	46.996
BT045	15.54	57.99	225.13	5.824
BT046	9.37	24.20	129.01	1.466
BT047	13.12	8.71	35.40	0.738
BT055	99.65	11.81	200.42	7.605
BT060	73.55	63.57	606.07	30.220
BT065	29.50	170.33	605.20	32.476
BT070	25.69	148.31	536.72	24.623
BT075	23.00	102.14	370.71	15.181
BT080	72.02	36.76	431.03	17.112
BT085	40.41	52.55	253.50	13.727
LT001	22.55	17.38	58.23	2.533
LT005	21.11	26.44	93.10	3.608
LT010	13.13	10.53	42.53	0.894
LT015	54.63	39.39	312.36	13.906
LT020	98.84	47.71	696.53	30.476

Table A.14 - Existing Conditions SWMM Input/Output

SPR001	0.00	0.00	0.00	0.000
SPR005	99.09	4.07	6.00	2.605
SPR010	19.67	15.54	52.85	1.976
IRR_RETURN	21.94	1.60	5.23	0.227
System	39.67	1596.96	7667.58	458.235

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Link Flow Summary
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Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days	hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
CE001	CONDUIT	267.17	0	00:35	9.11	1.08	1.00
CE001_OF	CONDUIT	459.09	0	00:55	1.99	0.02	0.10
CE405	DUMMY	695.99	0	00:35			
CE415	DUMMY	328.52	0	00:35			
CE500	DUMMY	42.53	0	00:40			
CE505	DUMMY	93.10	0	01:00			
CE510	DUMMY	58.23	0	01:00			
CE600	DUMMY	207.65	0	00:50			
CE625	DUMMY	731.01	0	00:53			
CE630	DUMMY	580.47	0	00:56			
CE635	CONDUIT	380.07	0	00:57	6.29	0.07	0.28
CE640	CONDUIT	35.02	0	00:56	3.31	0.01	0.06
CE650	DUMMY	100.96	0	00:40			
CE655	DUMMY	1109.49	0	01:12			
CE660	CONDUIT	277.94	0	00:51	7.00	0.13	0.40
CE665	CONDUIT	158.96	0	00:55	12.22	0.01	0.08
CE675	DUMMY	857.42	0	01:15			
CE803	DUMMY	133.57	0	01:15			
CE804	DUMMY	431.03	0	01:02			
CE805	CONDUIT	253.50	0	01:16	8.75	0.17	0.49
CE806	DUMMY	153.66	0	01:05			
CE807	CONDUIT	290.09	0	01:11	4.69	0.25	0.54
CE808	DUMMY	370.71	0	01:05			
CE809	DUMMY	536.72	0	01:10			
CE810	DUMMY	605.20	0	01:20			
CE811	DUMMY	606.07	0	01:13			
CE813	DUMMY	348.77	0	01:15			
CE814	DUMMY	225.13	0	00:45			
CE815	CONDUIT	475.75	0	01:22	6.53	0.32	0.60
CE818	DUMMY	886.73	0	01:20			
CE821	DUMMY	211.41	0	00:50			
CE824	DUMMY	198.21	0	01:05			
CE825	DUMMY	157.42	0	00:55			
CE834	DUMMY	119.66	0	00:45			
CE835	DUMMY	199.63	0	00:40			
CE837	DUMMY	35.40	0	00:40			
CE838	DUMMY	129.01	0	00:30			
CE910	CONDUIT	1068.89	0	01:12	6.61	0.90	0.96
CE911	CONDUIT	471.97	0	01:21	6.23	0.28	0.57
CE915	CONDUIT	6.00	0	02:44	1.85	0.01	0.09
CL_Out	CONDUIT	6.00	0	01:13	5.11	0.72	0.63
CL_Spill	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
D020	DUMMY	104.71	0	00:40			
D025	DUMMY	29.32	0	00:35			
D030	DUMMY	42.26	0	00:40			
D040	DUMMY	13.83	0	00:35			
D200	DUMMY	41.77	0	00:45			
D215	DUMMY	59.15	0	00:50			
D220	DUMMY	70.75	0	00:45			
D325	DUMMY	167.57	0	01:00			
D330	DUMMY	383.83	0	00:35			
D335	DUMMY	279.06	0	00:55			
D340	DUMMY	20.75	0	00:50			
D345	DUMMY	105.77	0	00:40			
E110_OF	CONDUIT	1260.95	0	02:35	5.88	0.44	0.72
E300	DUMMY	1370.68	0	03:01			
E305	CONDUIT	67.74	0	00:36	4.32	0.01	0.15
E310	CONDUIT	47.61	0	01:39	4.13	1.08	1.00
E310_OF	CONDUIT	1316.29	0	02:57	6.55	0.29	0.60
E320	CONDUIT	75.94	0	00:40	6.51	0.00	0.06
E350	CONDUIT	91.19	0	00:43	4.04	0.01	0.17
E355	CONDUIT	276.76	0	01:07	3.75	0.06	0.30
E360	CONDUIT	476.83	0	01:07	6.16	0.06	0.31
E904	CONDUIT	1360.35	0	02:56	13.11	0.10	0.37
E906	CONDUIT	1308.87	0	02:56	16.11	0.36	0.63
E922	CONDUIT	499.65	0	01:12	4.84	0.10	0.37
E923	CONDUIT	48.71	0	01:36	4.81	1.12	1.00
E923_OF	CONDUIT	20.17	0	01:27	3.08	0.11	0.35
E927	CONDUIT	733.46	0	01:17	2.55	0.58	0.80
E933	CONDUIT	1360.25	0	02:58	6.82	0.23	0.54
E934	CONDUIT	126.07	0	00:33	6.98	1.08	1.00
E934_OF	CONDUIT	1243.48	0	02:59	5.36	0.35	0.65
E935	CONDUIT	1359.38	0	03:01	9.36	0.15	0.45
E936	CONDUIT	197.09	0	05:41	13.39	1.07	1.00
E936_OF	CONDUIT	1176.32	0	02:58	5.73	0.30	0.61
E937	CONDUIT	1360.20	0	02:58	7.91	0.24	0.54
E938	CONDUIT	201.51	0	05:35	17.10	1.08	1.00
E938_OF	CONDUIT	1173.34	0	02:56	7.34	0.21	0.53
E939	CONDUIT	1360.31	0	02:57	7.61	0.20	0.51
E948	CONDUIT	123.88	0	00:47	10.77	1.08	1.00
E948_OF	CONDUIT	618.60	0	01:17	4.40	0.16	0.48
E956	CONDUIT	1297.22	0	02:35	8.11	0.02	0.23
E957	CONDUIT	143.48	0	00:36	6.90	1.12	1.00
E957_OF	CONDUIT	614.25	0	01:08	4.26	0.57	0.80
E958	CONDUIT	55.28	0	01:49	7.39	0.65	0.58
E959	CONDUIT	55.71	0	01:48	4.81	1.08	1.00
E959_OF	CONDUIT	1308.94	0	02:55	6.18	0.85	0.93
E960	CONDUIT	57.00	0	01:48	6.71	0.78	0.65
Eh_In	DUMMY	733.35	0	01:17			
L010	CONDUIT	12.69	0	00:27	7.80	1.08	1.00
L010_OF	CONDUIT	19.22	0	00:36	2.97	0.04	0.21
L015	CONDUIT	20.90	0	00:45	2.35	0.00	0.11
L019	CONDUIT	161.35	0	00:43	3.07	0.05	0.30
L045_OF	DUMMY	36.28	0	00:45			
L100	CONDUIT	168.10	0	00:58	4.21	0.26	0.59
L105	CONDUIT	138.49	0	00:55	5.91	0.13	0.44
L110	CONDUIT	54.79	0	00:42	3.45	1.00	1.00
917	DUMMY	2276.86	0	01:28			
L120	CONDUIT	124.30	0	01:08	13.93	1.08	1.00
L120_OF	CONDUIT	45.42	0	00:45	3.88	0.09	0.32
L125	DUMMY	357.62	0	01:15			
L130	CONDUIT	12.80	0	07:05	4.42	1.07	1.00
L130_OF	CONDUIT	2000.98	0	01:31	4.53	0.75	0.89
L135	CONDUIT	371.97	0	00:55	12.87	0.01	0.05
L140	CONDUIT	460.16	0	01:16	4.43	0.12	0.43
L145	CONDUIT	312.65	0	01:24	3.76	0.08	0.27
L205	CONDUIT	12.07	0	00:40	4.11	0.01	0.10

Table A.14 - Existing Conditions SWMM Input/Output

L206	CONDUIT	10.75	0	00:43	1.46	0.02	0.19
L900	CHANNEL	359.27	0	00:57	5.76	0.21	0.48
L901	CONDUIT	351.55	0	00:54	11.22	1.12	0.96
L901_OF	CONDUIT	44.76	0	00:57	2.85	0.00	0.06
L902	CONDUIT	396.18	0	00:59	7.21	0.04	0.25
L903	CONDUIT	696.53	0	00:56	5.92	0.48	0.70
L905	CONDUIT	490.82	0	00:55	6.68	0.08	0.36
L916	CONDUIT	440.29	0	00:54	14.70	1.12	1.00
L916_OF	CONDUIT	72.81	0	00:58	4.40	0.17	0.44
L918	CONDUIT	1311.47	0	02:24	4.66	0.44	0.73
L920	CONDUIT	1023.36	0	01:30	4.56	0.39	0.66
L926	CONDUIT	39.72	0	00:47	2.17	0.01	0.17
L928	CONDUIT	159.94	0	00:47	2.58	0.09	0.37
L929	CONDUIT	12.12	0	07:06	1.35	0.04	0.26
L930	CONDUIT	30.93	0	00:37	1.90	0.22	0.52
L931	CONDUIT	396.27	0	00:58	1.33	0.09	0.38
L932	CONDUIT	128.90	0	00:38	4.30	1.00	1.00
L932_OF	CONDUIT	267.29	0	00:59	2.55	0.34	0.64
L950	CONDUIT	322.38	0	00:56	11.04	1.07	0.95
L950_OF	CONDUIT	36.95	0	00:56	4.95	0.00	0.06
L951	CONDUIT	6.99	0	00:25	2.58	1.08	1.00
L951_OF	CONDUIT	21.33	0	00:38	4.60	0.00	0.09
L952	CONDUIT	1.82	0	02:18	0.74	1.08	1.00
L952_OF	CONDUIT	46.06	0	00:43	3.71	0.01	0.14
L953	CONDUIT	5.23	0	01:26	1.92	1.08	1.00
L953_OF	CONDUIT	9.84	0	00:45	4.31	0.00	0.07
Q210	CONDUIT	30.96	0	00:58	10.70	1.07	1.00
Q210_OF	CONDUIT	14.04	0	00:40	3.29	0.03	0.21
Q225	CONDUIT	84.88	0	01:10	5.88	0.05	0.29
Q225_OF	CONDUIT	84.32	0	01:13	4.81	0.07	0.33
Q919	CONDUIT	312.36	0	01:25	14.76	0.97	0.79
Q919_OF	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
Q940	CONDUIT	21.52	0	03:05	4.82	1.08	1.00
Q940_OF	CONDUIT	64.76	0	01:14	1.91	0.13	0.39
Q941	CONDUIT	144.67	0	02:06	8.18	1.08	1.00
Q941_OF	CONDUIT	129.09	0	01:20	6.11	0.36	0.66
Q942	CONDUIT	126.15	0	01:02	10.96	1.08	1.00
Q942_OF	CONDUIT	19.79	0	01:12	3.38	0.02	0.15
Q943	CONDUIT	49.98	0	00:35	7.75	1.08	1.00
Q943_OF	CONDUIT	90.37	0	01:09	2.81	0.12	0.37
Q944	CONDUIT	326.37	0	01:24	17.91	1.10	0.89
Q945	CONDUIT	313.44	0	01:25	3.65	0.52	0.74
Q946	CONDUIT	312.49	0	01:25	3.67	0.85	0.73
Q947	CONDUIT	312.44	0	01:25	10.97	0.10	0.34
SPR836	DUMMY	52.85	0	00:55			
SPR925	CONDUIT	6.00	0	03:58	6.24	0.08	0.19
944_OF	CONDUIT	8.87	0	01:18	6.81	0.04	0.19
L137	CONDUIT	339.78	0	01:19	2.84	0.05	0.21
L136	CONDUIT	1617.65	0	01:31	6.57	0.14	0.36
L115	CONDUIT	57.03	0	00:54	4.16	0.00	0.08
L116	CONDUIT	147.69	0	01:18	1.07	0.13	0.39
L117	CONDUIT	136.27	0	00:48	5.24	0.02	0.16
47	CONDUIT	22.00	0	00:46	8.91	0.12	0.36
48	CONDUIT	42.30	0	01:08	3.12	0.14	0.36
PH_Weir	WEIR	1315.02	0	02:18			0.00
Centennial_Out	DUMMY	6.00	0	00:39			
CF_OUT	DUMMY	59.23	0	01:23			
EL_OUT	DUMMY	1360.53	0	02:54			
SV_S_Outlet	DUMMY	6.00	0	01:12			

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Conduit Surcharge Summary
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Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
CE001	1.13	1.17	1.13	1.91	1.17
CE405	0.01	0.01	0.01	24.00	0.01
CE415	0.01	0.01	0.01	24.00	0.01
CE500	0.01	0.01	0.01	24.00	0.01
CE505	0.01	0.01	0.01	24.00	0.01
CE510	0.01	0.01	0.01	24.00	0.01
CE600	0.01	0.01	0.01	24.00	0.01
CE625	0.01	0.01	0.01	24.00	0.01
CE630	0.01	0.01	0.01	24.00	0.01
CE650	0.01	0.01	0.01	24.00	0.01
CE655	0.01	0.01	0.01	24.00	0.01
CE675	0.01	0.01	0.01	24.00	0.01
CE803	0.01	0.01	0.01	24.00	0.01
CE804	0.01	0.01	0.01	24.00	0.01
CE806	0.01	0.01	0.01	24.00	0.01
CE808	0.01	0.01	0.01	24.00	0.01
CE809	0.01	0.01	0.01	24.00	0.01
CE810	0.01	0.01	0.01	24.00	0.01
CE811	0.01	0.01	0.01	24.00	0.01
CE813	0.01	0.01	0.01	24.00	0.01
CE814	0.01	0.01	0.01	24.00	0.01
CE818	0.01	0.01	0.01	24.00	0.01
CE821	0.01	0.01	0.01	24.00	0.01
CE824	0.01	0.01	0.01	24.00	0.01
CE825	0.01	0.01	0.01	24.00	0.01
CE834	0.01	0.01	0.01	24.00	0.01
CE835	0.01	0.01	0.01	24.00	0.01
CE837	0.01	0.01	0.01	24.00	0.01
CE838	0.01	0.01	0.01	24.00	0.01
D020	0.01	0.01	0.01	24.00	0.01
D025	0.01	0.01	0.01	24.00	0.01
D030	0.01	0.01	0.01	24.00	0.01
D040	0.01	0.01	0.01	24.00	0.01
D200	0.01	0.01	0.01	24.00	0.01
D215	0.01	0.01	0.01	24.00	0.01
D220	0.01	0.01	0.01	24.00	0.01
D325	0.01	0.01	0.01	24.00	0.01
D330	0.01	0.01	0.01	24.00	0.01
D335	0.01	0.01	0.01	24.00	0.01
D340	0.01	0.01	0.01	24.00	0.01
D345	0.01	0.01	0.01	24.00	0.01
E300	0.01	0.01	0.01	24.00	0.01
E310	15.55	15.64	15.55	0.10	15.64
E923	0.17	0.20	0.18	0.22	0.20
E934	5.22	5.26	5.23	5.28	5.26
E936	3.26	3.37	3.26	3.37	3.37
E938	3.11	3.19	3.11	3.20	3.19
E948	2.45	2.47	2.45	0.03	2.47
E957	2.33	2.36	2.33	2.92	2.36
E959	12.85	12.94	12.86	12.96	12.94
Eh_In	0.01	0.01	0.01	24.00	0.01
L010	0.71	0.72	0.71	0.73	0.72
L045_OF	0.01	0.01	0.01	24.00	0.01
L110	6.45	6.61	6.52	6.52	6.61

Table A.14 - Existing Conditions SWMM Input/Output

917	0.01	0.01	0.01	24.00	0.01
L120	0.57	0.63	0.57	0.64	0.63
L125	0.01	0.01	0.01	24.00	0.01
L130	6.65	6.67	6.65	0.03	6.67
L901	0.01	0.42	0.01	1.34	0.42
L916	0.26	0.35	0.26	1.18	0.35
L932	1.59	1.60	1.60	1.60	1.60
L950	0.01	0.48	0.01	1.41	0.48
L951	0.70	0.77	0.72	0.78	0.77
L952	1.89	1.97	1.94	0.08	1.97
L953	0.91	0.99	0.94	0.08	0.99
Q210	0.44	0.49	0.44	0.06	0.49
Q919	0.01	0.01	0.01	1.50	0.01
Q940	2.38	2.42	2.39	0.07	2.42
Q941	1.26	1.36	1.28	1.41	1.36
Q942	0.37	0.54	0.38	0.17	0.54
Q943	1.77	1.81	1.78	0.05	1.81
Q944	0.01	0.26	0.01	0.26	0.26
Q946	0.01	0.01	0.01	1.30	0.01
SPR836	0.01	0.01	0.01	24.00	0.01

```
Analysis begun on:  Tue Sep 09 16:37:14 2014
Analysis ended on:  Tue Sep 09 16:37:15 2014
Total elapsed time: 00:00:01
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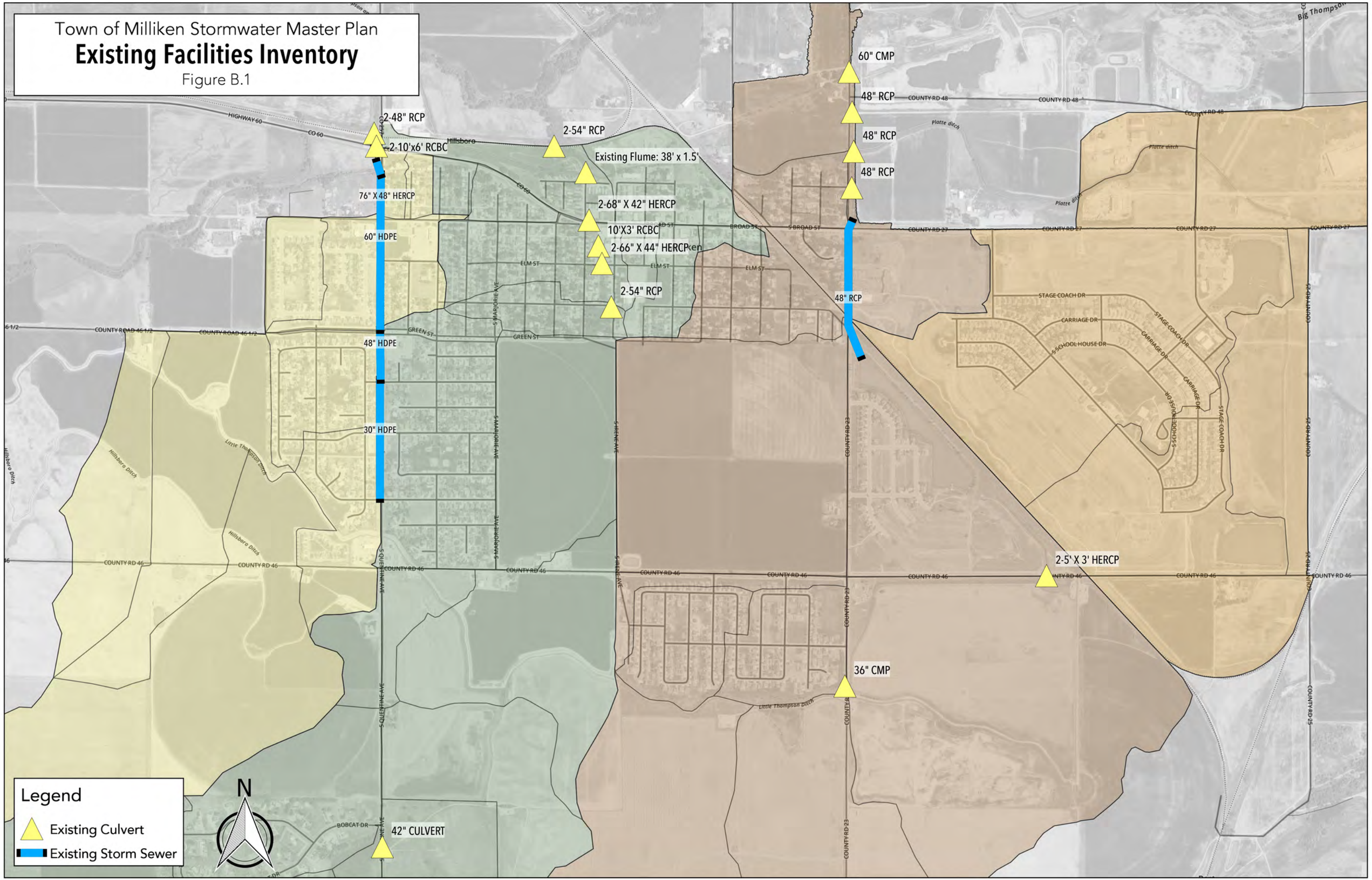
APPENDIX B – HYDRAULIC ANALYSIS

ICON ENGINEERING, INC.

Town of Milliken Stormwater Master Plan

Existing Facilities Inventory

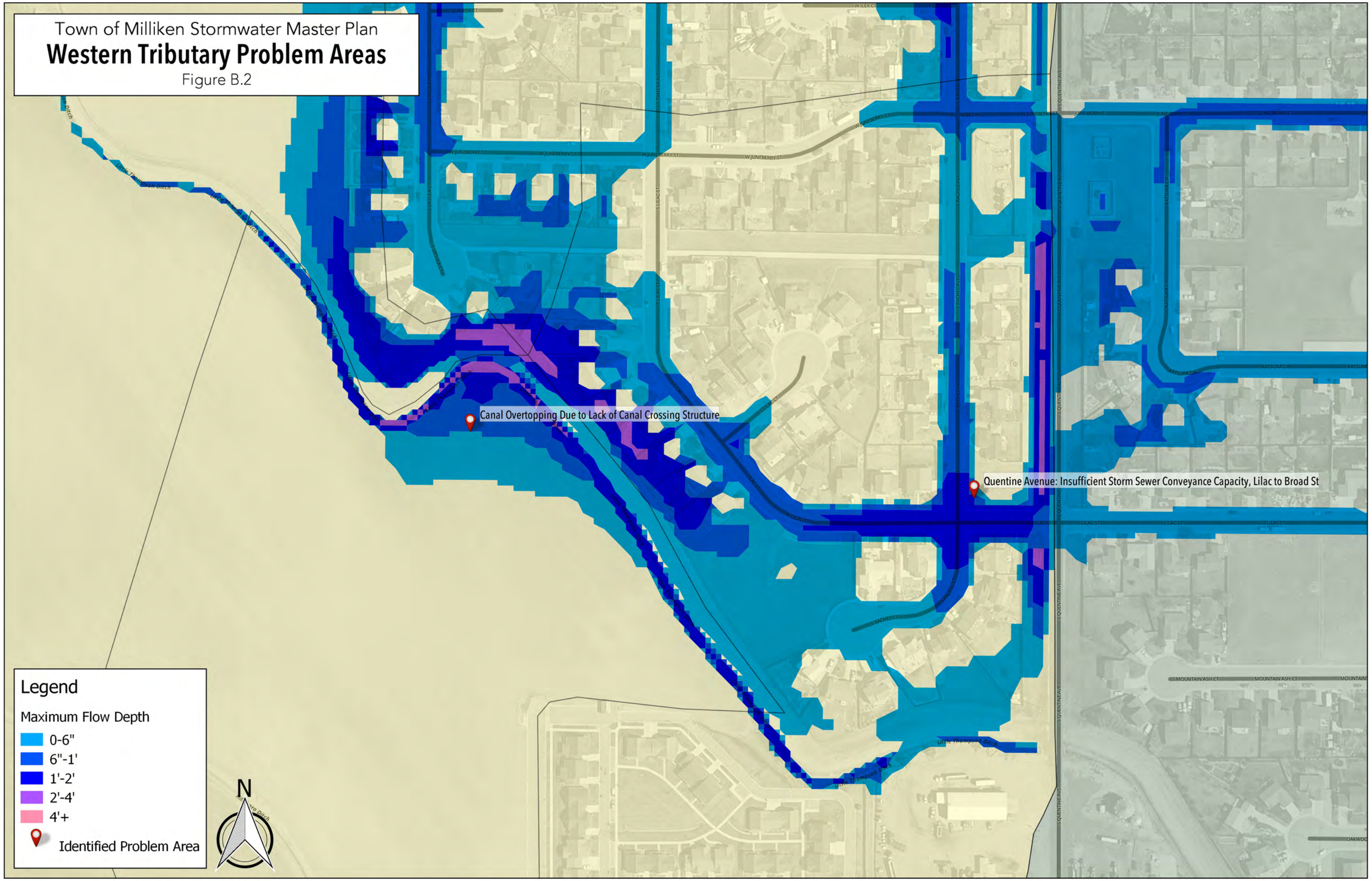
Figure B.1



Town of Milliken Stormwater Master Plan

Western Tributary Problem Areas

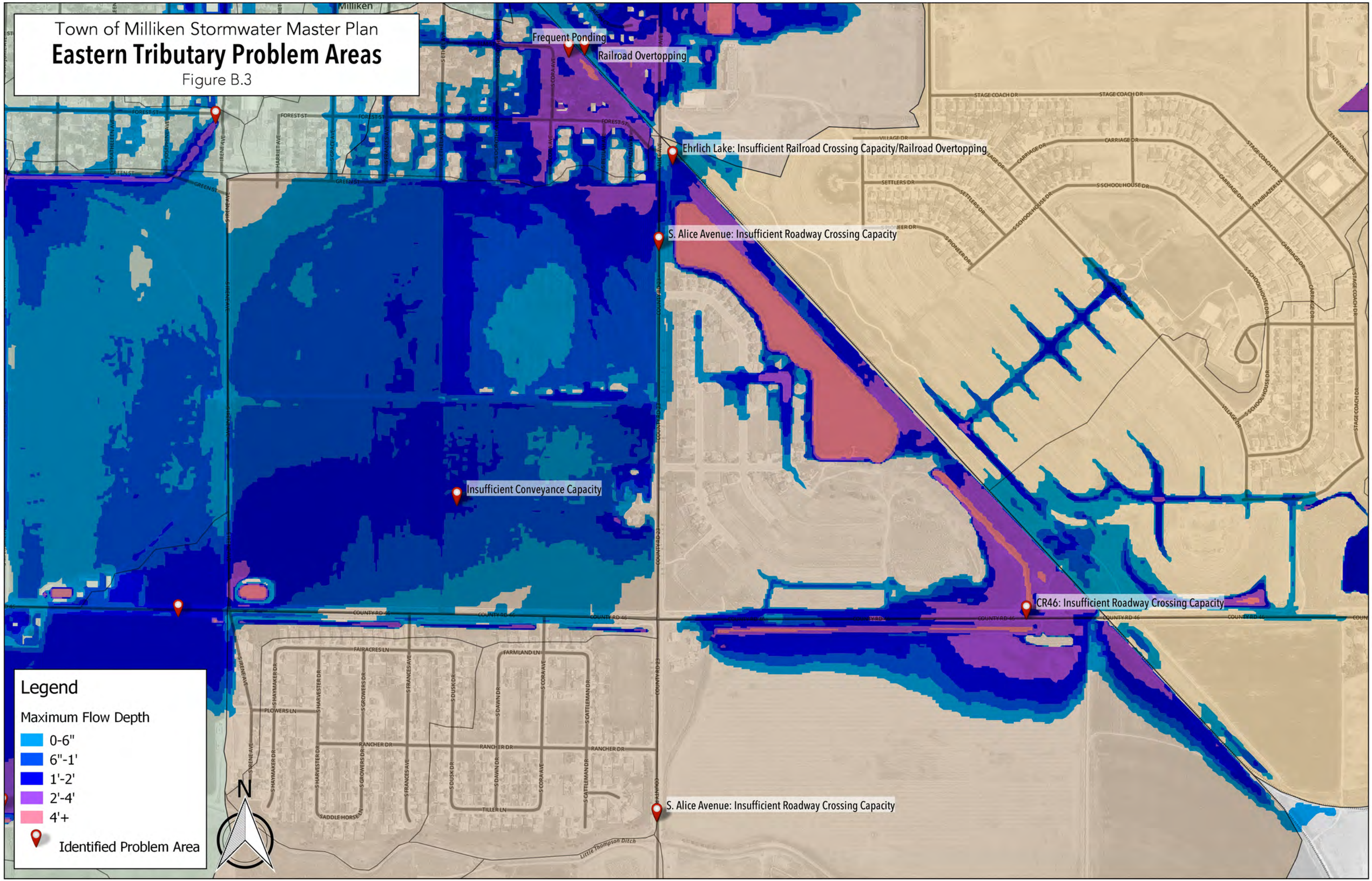
Figure B.2



Town of Milliken Stormwater Master Plan

Eastern Tributary Problem Areas

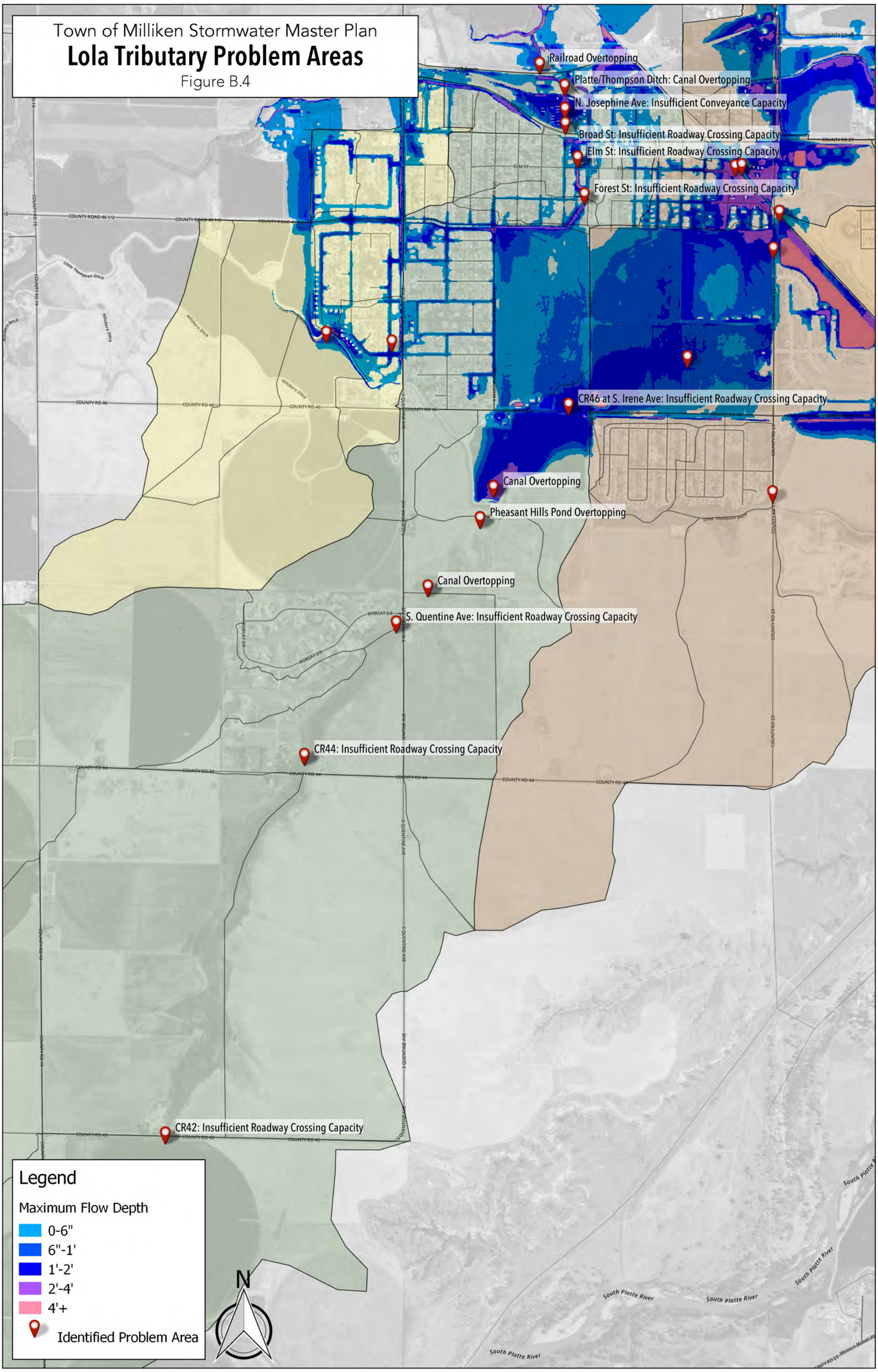
Figure B.3



Town of Milliken Stormwater Master Plan

Lola Tributary Problem Areas

Figure B.4



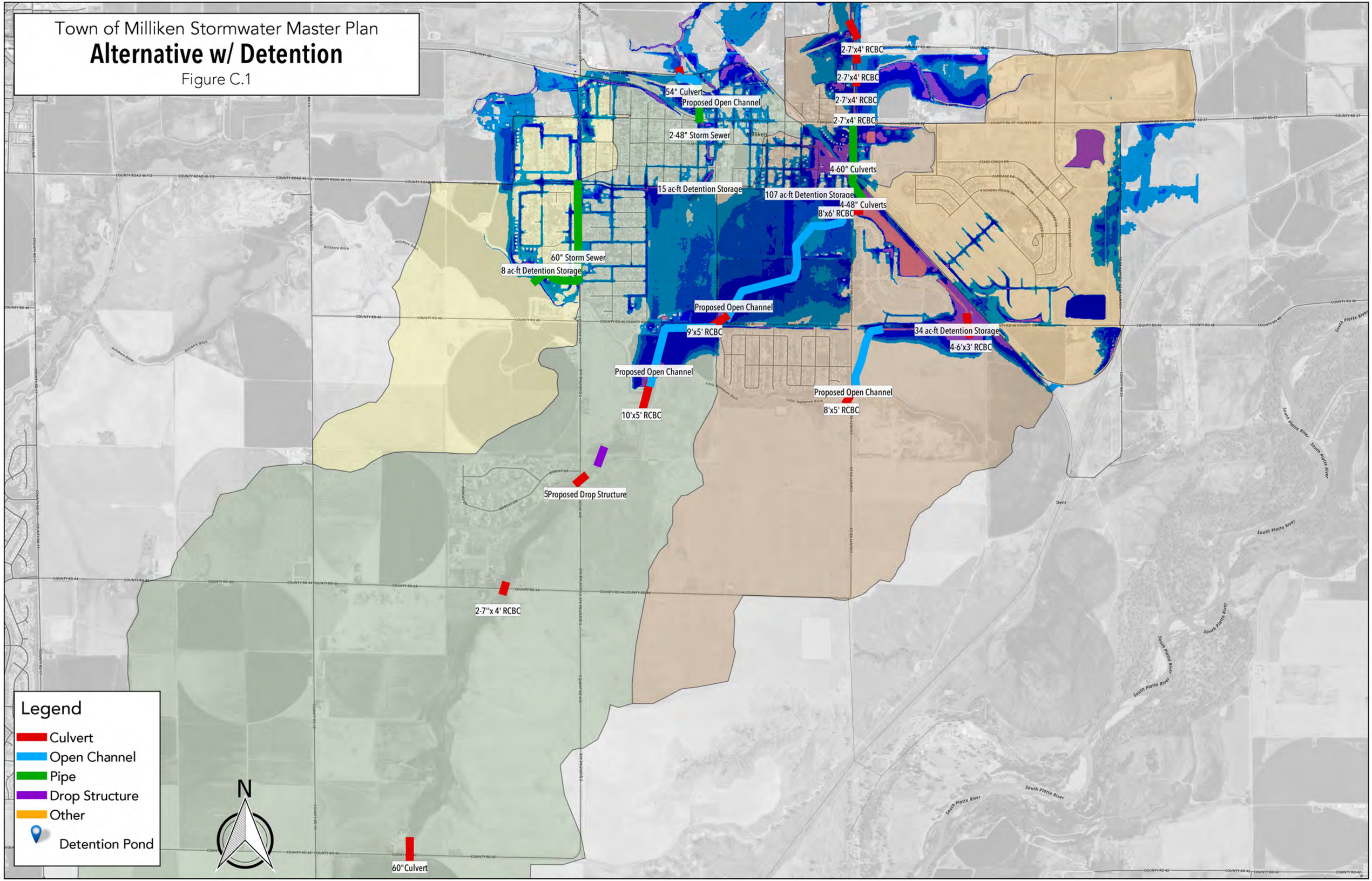
APPENDIX C – ALTERNATIVES ANALYSIS

ICON ENGINEERING, INC.

Town of Milliken Stormwater Master Plan

Alternative w/ Detention

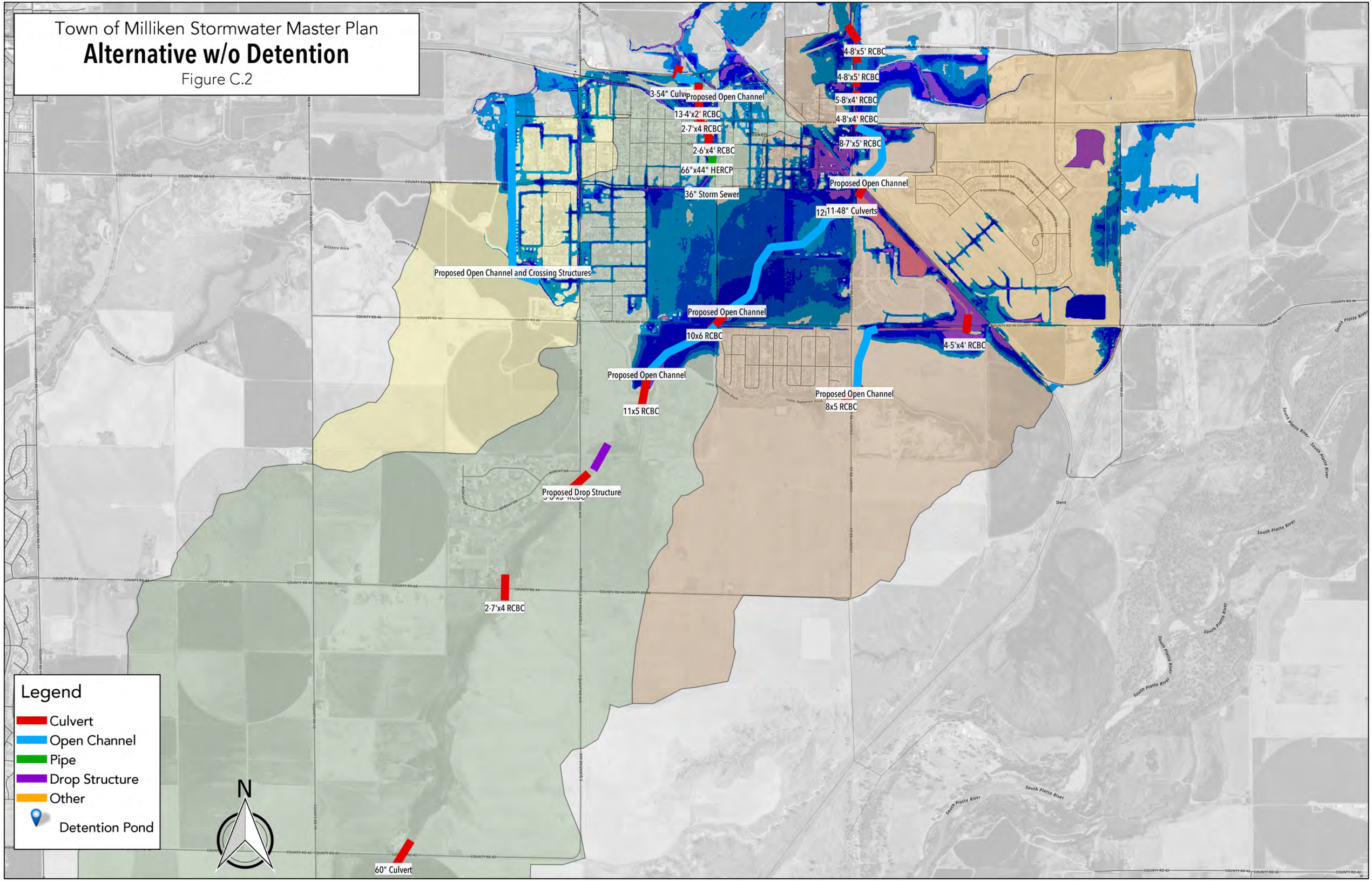
Figure C.1



Town of Milliken Stormwater Master Plan

Alternative w/o Detention

Figure C.2



MASTER PLAN COST ESTIMATE FOR INDIVIDUAL REACH

PROJECT :	Milliken Master Plan - 100-Year Conveyance with Detention Alternative
DRAINAGEWAY :	Western Tributary
REACH :	Western Tributary
JURISDICTION :	Milliken
REACH ID:	West-ReachWestern Tributary TGM — DATE : 9/1/2014

DESCRIPTION			QUANTITY	UNIT	UNIT COST	TOTAL COST	USER COMMENTS
Pipe Culverts and Storm Drains							
Circular Pipes							
Diameter (in)	Length (ft)	No. of Barrels					
60-inch	2800	1	2800	L.F.	$286.00	$800,800.00	Quentine Outfall improvements
Headwalls							
Diameter (in)	Applicable	No. of Barrels					
60-inch	Yes	1	1	EA	$1,930.42	$1,930.00	
Wingwalls (includes concrete apron)							
Diameter (in)		No. of Barrels					
60-inch		1	1	EA	$10,706.05	$10,706.00	
Manholes and Inlets							
Type B Manhole (Pipe Dia. 48" and larger, deflection < 10 degrees)			8	EA	$14,300.00	$114,400.00	
Type P Manhole (Pipe Dia. 48" and larger, deflection > 10 degrees)			1	EA	$17,900.00	$17,900.00	
Detention/Water Quality Facilities							
Detention (Complete-in-Place)							
Detention Facility 1 (Complete-in-Place)			8	AC-FT	$54,300.00	$434,400.00	Quentine Pond
Detention (User Entered Quantities)							
Outlet Works			1	EA	$25,000.00	$25,000.00	
Removals							
Removal of culvert pipe (D<48")			1950	L.F.	$24.00	$46,800.00	
Landscaping and Maintenance Improvements							
Reclamation & seeding (native grasses)			5	ACRE	$1,190.00	$5,950.00	
Special Items (User Defined)							
Asphalt Patch (Quentine)	<----User Defined Items		5000	S.Y.	$45.00	$225,000.00	
Land Acquisition							
Easement/ROW Acquisition			10.00	ACRE	$758.00	$7,580.00	Quentine Pond

Master Plan Capital Improvement Cost Summary

Capital Improvement Costs				
Pipe Culverts and Storm Drains			$945,736.00	
Concrete Box Culverts			$0.00	
Hydraulic Structures			$0.00	
Channel Improvements			$0.00	
Detention/Water Quality Facilities			$459,400.00	
Removals			$46,800.00	
Landscaping and Maintenance Improvements			$5,950.00	
Special Items (User Defined)			$225,000.00	
Subtotal Capital Improvement Costs			**$1,682,886.00**	
Additional Capital Improvement Costs				
Dewatering	$32,239.00	L.S.	$32,239.00	
Mobilization	5%		$84,144.00	
Traffic Control	$20,000.00	L.S.	$20,000.00	
Utility Coordination/Relocation	$200,000.00	L.S.	$200,000.00	
Stormwater Management/Erosion Control	5%		$84,144.00	
Subtotal Additional Capital Improvement Costs			**$420,527.00**	
Land Acquisition Costs				
ROW/Easements			$7,580.00	
Subtotal Land Acquisition Costs			**$7,580.00**	
Other Costs (percentage of Capital Improvement Costs)				
Engineering	15%		$315,512.00	
Legal/Administrative	5%		$105,171.00	
Contract Admin/Construction Management	10%		$210,341.00	
Contingency	25%		$525,853.00	
Subtotal Other Costs			**$1,156,877.00**	
Total Capital Improvement Costs			**$3,267,870.00**	

Master Plan Operation and Maintenance Cost Summary

Description	Quantity	Unit	Unit Cost	Total Annual Cost
Manhole and Inlet Maintenance (e.g. sediment & debris removal, structural repairs, etc.)	8	EA	$60.00	$240.00
Detention/WQ Maintenance (e.g. sediment & debris removal, mucking out, tree & weed removal, s	10	ACRE	$1,790.00	$8,950.00
Total Annual Operation and Maintenance Cost				**$9,190.00**
Effective Interest Rate				0.00%
Total Operation and Maintenance Costs Over 50 Years				**$459,500.00**

MASTER PLAN COST ESTIMATE FOR INDIVIDUAL REACH

PROJECT :	Milliken Master Plan - 100-Year Conveyance with Detention Alternative
DRAINAGEWAY :	Lola Park Tributary
REACH :	Lola
JURISDICTION :	Milliken
REACH ID:	Lola-ReachLola TGM — DATE : 9/1/2014

DESCRIPTION			QUANTITY	UNIT	UNIT COST	TOTAL COST	USER COMMENTS
Pipe Culverts and Storm Drains							
Circular Pipes							
Diameter (in)	Length (ft)	No. of Barrels					
60-inch	400	1	400	L.F.	$286.00	$114,400.00	CR42
48-inch	450	2	900	L.F.	$171.00	$153,900.00	Josephine Outfall
24-inch	100	11	1100	L.F.	$86.00	$94,600.00	Platte/Thompson Ditch crossing
Flare End Sections							
Diameter (in)	Applicable	No. of Barrels					
24-inch	Yes	11	11	EA	$1,154.00	$12,694.00	
Headwalls							
Diameter (in)	Applicable	No. of Barrels					
60-inch	Yes	1	2	EA	$1,930.42	$3,861.00	
Wingwalls (includes concrete apron)							
Diameter (in)		No. of Barrels					
60-inch		1	2	EA	$10,706.05	$21,412.00	
Manholes and Inlets							
Manhole, 6' Dia. (Pipe Dia. = 48")			2	EA	$5,120.00	$10,240.00	
Concrete Box Culverts							
Box Culvert Pipe							
Individual Box Span (ft)	Box Height (ft)	No. of Barrels	Length (ft)				
7	4	2	75	L.F.	$1,450.54	$108,790.00	CR44
8	5	5	100	L.F.	$4,150.14	$415,014.00	S. Quentine
10	5	1	525	L.F.	$1,000.10	$525,050.00	Pheasant Hills outlet, Hillsboro crossing structure
9	5	1	200	L.F.	$914.88	$182,977.00	CR46 @ Irene
8	6	1	200	L.F.	$876.61	$175,322.00	alice crossing
Headwall and Toewalls							
Individual Box Span (ft)	No. of Barrels	Total Span (ft)					
7	2	17.00	2	EA	$1,433.73	$2,867.00	
8	5	45.00	2	EA	$3,814.43	$7,629.00	
10	1	12.00	2	EA	$1,090.37	$2,181.00	
9	1	11.00	2	EA	$932.42	$1,865.00	
8	1	10.00	2	EA	$847.65	$1,695.00	
Wingwalls (includes wingwalls on either side of channel and concrete apron)							
Individual Box Span (ft)	Box Rise (ft)	No. of Barrels					
7	4	2	2	EA	$9,377.90	$18,755.80	
8	5	5	2	EA	$18,579.62	$37,159.20	
10	5	1	2	EA	$10,823.57	$21,647.10	
9	5	1	2	EA	$10,588.54	$21,177.10	
8	6	1	2	EA	$13,143.45	$26,286.90	
Hydraulic Structures							
Sloping Drop Structures							
Height (ft)	Bottom Width (ft)	Yn (ft)					
12	40	5	1	EA	$221,947.29	$221,947.00	
Channel Improvements							
Excavation, Low Range			111000	C.Y.	$13.00	$1,443,000.00	Channel from Pheasant Hills to Alice
Excavation, Low Range			7500	C.Y.	$13.00	$97,500.00	Josephine Outfall Channel
Soil Riprap, Type M			500	C.Y.	$83.00	$41,500.00	
Detention/Water Quality Facilities							
Detention (Complete-in-Place)							
Detention Facility 1 (Complete-in-Place)			59	AC-FT	$54,300.00	$3,203,700.00	Pheasant Hills pond improvements
Detention Facility 2 (Complete-in-Place)			16	AC-FT	$54,300.00	$868,800.00	Lola Park Pond
Detention (User Entered Quantities)							
Outlet Works			2	EA	$20,000.00	$40,000.00	
Landscaping and Maintenance Improvements							
Reclamation & seeding (native grasses)			160	ACRE	$1,190.00	$190,400.00	
Special Items (User Defined)							
Raise Pheasant Hills Berm	<----User Defined Items		3000	CY	$20.00	$60,000.00	
Boring 54" Pipe under UPRR	<----User Defined Items		100	LF	$4,500.00	$450,000.00	
Broad St. Transition to 2-48" pipes	<----User Defined Items		35	CY	$800.00	$28,000.00	
Platte/Thompson Ditch Transition	<----User Defined Items		45	CY	$800.00	$36,000.00	
Property Acquisition	<----User Defined Items		14	AC	$1,029.30	$14,410.00	Lola Pond
Asphalt Patch (Josephine & Alice)	<----User Defined Items		4000	SY	$45.00	$180,000.00	
Land Acquisition							
Easement/ROW Acquisition			80.00	ACRE	$231.69	$18,535.00	Alice Pond

Master Plan Capital Improvement Cost Summary

Capital Improvement Costs				
Pipe Culverts and Storm Drains			$411,107.00	
Concrete Box Culverts			$1,548,416.00	
Hydraulic Structures			$221,947.00	
Channel Improvements			$1,582,000.00	
Detention/Water Quality Facilities			$4,112,500.00	
Removals			$0.00	
Landscaping and Maintenance Improvements			$190,400.00	
Special Items (User Defined)			$768,410.00	
Subtotal Capital Improvement Costs			**$8,834,780.00**	
Additional Capital Improvement Costs				
Dewatering	$17,129.00	L.S.	$17,129.00	
Mobilization	5%		$441,739.00	
Traffic Control	$25,000.00	L.S.	$25,000.00	
Utility Coordination/Relocation	$200,000.00	L.S.	$200,000.00	
Stormwater Management/Erosion Control	5%		$441,739.00	
Subtotal Additional Capital Improvement Costs			**$1,125,607.00**	
Land Acquisition Costs				
ROW/Easements			$18,535.00	
Subtotal Land Acquisition Costs			**$18,535.00**	
Other Costs (percentage of Capital Improvement Costs)				
Engineering	15%		$1,494,058.00	
Legal/Administrative	5%		$498,019.00	
Contract Admin/Construction Management	10%		$996,039.00	
Contingency	25%		$2,490,097.00	
Subtotal Other Costs			**$5,478,213.00**	
Total Capital Improvement Costs			**$15,457,135.00**	

Master Plan Operation and Maintenance Cost Summary

Description	Quantity	Unit	Unit Cost	Total Annual Cost
Culvert Maintenance (e.g. sediment & debris removal, erosion at entrance/exit, structural repairs, e	3500	L.F.	$1.00	$1,750.00
Manhole and Inlet Maintenance (e.g. sediment & debris removal, structural repairs, etc.)	2	EA	$60.00	$60.00
Channel Maintenance (e.g. sediment & debris removal, erosion, tree & weed removal, etc.)	7300	L.F.	$2.00	$7,300.00
Detention/WQ Maintenance (e.g. sediment & debris removal, mucking out, tree & weed removal, s	10	ACRE	$1,790.00	$3,580.00
Total Annual Operation and Maintenance Cost				**$12,690.00**
Effective Interest Rate				0.00%
Total Operation and Maintenance Costs Over 50 Years				**$634,500.00**

MASTER PLAN COST ESTIMATE FOR INDIVIDUAL REACH

PROJECT :	Milliken Master Plan - 100-Year Conveyance with Detention Alternative
DRAINAGEWAY :	Eastern Tributary
REACH :	Eastern Tributary
JURISDICTION :	Milliken
REACH ID:	East-ReachEastern Tributary TGM DATE : 9/1/2014

DESCRIPTION			QUANTITY	UNIT	UNIT COST	TOTAL COST	USER COMMENTS
Pipe Culverts and Storm Drains							
Circular Pipes							
Diameter (in)	Length (ft)	No. of Barrels					
60-inch	1350	4	5400	L.F.	$286.00	$1,544,400.00	Broad Street
Headwalls							
Diameter (in)	Applicable	No. of Barrels					
60-inch	Yes	4	2	EA	$5,856.02	$11,712.00	
Wingwalls (includes concrete apron)							
Diameter (in)		No. of Barrels					
60-inch		4	2	EA	$16,346.82	$32,694.00	
Manholes and Inlets							
Type B Manhole (Pipe Dia. 48" and larger, deflection < 10 degrees)			16	EA	$14,300.00	$228,800.00	
Type P Manhole (Pipe Dia. 48" and larger, deflection > 10 degrees)			4	EA	$17,900.00	$71,600.00	Ehrlich outfall
Concrete Box Culverts							
Box Culvert Pipe							
Individual Box Span (ft)	Box Height (ft)	No. of Barrels	Length (ft)				
8	5	1	300	L.F.	$830.03	$249,008.00	S.Alice @ Centennial Farms
5	4	3	100	L.F.	$1,833.16	$183,316.00	CR46
7	4	2	100	L.F.	$1,450.54	$145,054.00	Cherry Street
7	4	2	100	L.F.	$1,450.54	$145,054.00	Platte/Thompson
7	4	2	100	L.F.	$1,450.54	$145,054.00	CR48
7	4	2	100	L.F.	$1,450.54	$145,054.00	Alice North
Headwall and Toewalls							
Individual Box Span (ft)	No. of Barrels	Total Span (ft)					
8	1	10.00	2	EA	$847.65	$1,695.00	
5	3	18.00	2	EA	$1,456.43	$2,913.00	
7	2	17.00	2	EA	$1,433.73	$2,867.00	
7	2	17.00	2	EA	$1,433.73	$2,867.00	
7	2	17.00	2	EA	$1,433.73	$2,867.00	
7	2	17.00	2	EA	$1,433.73	$2,867.00	
Wingwalls (includes wingwalls on either side of channel and concrete apron)							
Individual Box Span (ft)	Box Rise (ft)	No. of Barrels					
8	5	1	2	EA	$10,353.50	$20,707.00	
5	4	3	2	EA	$9,798.86	$19,597.70	
7	4	2	2	EA	$9,377.90	$18,755.80	
7	4	2	2	EA	$9,377.90	$18,755.80	
7	4	2	2	EA	$9,377.90	$18,755.80	
7	4	2	2	EA	$9,377.90	$18,755.80	
Channel Improvements							
Soil Riprap, Type M			750	C.Y.	$83.00	$62,250.00	
Excavation, Low Range			6500	C.Y.	$13.00	$84,500.00	Centennial Farms outfall
Detention/Water Quality Facilities							
Detention (Complete-in-Place)							
Detention Facility 1 (Complete-in-Place)			107	AC-FT	$54,300.00	$5,788,380.00	Alice Pond
Detention Facility 2 (Complete-in-Place)			35	AC-FT	$54,300.00	$1,900,500.00	CR46 Pond
Detention (User Entered Quantities)							
Outlet Works			2	EA	$25,000.00	$50,000.00	
Removals							
Removal of culvert pipe (48"<D<84")			400	L.F.	$60.00	$24,000.00	
Landscaping and Maintenance Improvements							
Reclamation & seeding (native grasses)			100	ACRE	$1,190.00	$119,000.00	
Special Items (User Defined)							
Asphalt Patch (alice)	<----User Defined Items		2900	SY	$45.00	$130,500.00	
Boring new Ehrlich Outfall	<----User Defined Items		4	EA	$400,000.00	$1,600,000.00	4-48"steel pipes
Transition Structure (4-48" to 4-60")	<----User Defined Items		20	CY	$800.00	$16,000.00	
Land Acquisition							
Easement/ROW Acquisition			195.50	ACRE	$125.46	$24,527.00	CR46 pond, Alice Pond

Master Plan Capital Improvement Cost Summary

Capital Improvement Costs				
Pipe Culverts and Storm Drains				$1,889,206.00
Concrete Box Culverts				$1,143,944.00
Hydraulic Structures				$0.00
Channel Improvements				$146,750.00
Detention/Water Quality Facilities				$7,738,880.00
Removals				$24,000.00
Landscaping and Maintenance Improvements				$119,000.00
Special Items (User Defined)				$1,746,500.00
Subtotal Capital Improvement Costs				**$12,808,280.00**
Additional Capital Improvement Costs				
Dewatering	$12,455.00	L.S.		$12,455.00
Mobilization	5%			$640,414.00
Traffic Control	$20,000.00	L.S.		$20,000.00
Utility Coordination/Relocation	$200,000.00	L.S.		$200,000.00
Stormwater Management/Erosion Control	5%			$640,414.00
Subtotal Additional Capital Improvement Costs				**$1,513,283.00**
Land Acquisition Costs				
ROW//Easements				$24,527.00
Subtotal Land Acquisition Costs				**$24,527.00**
Other Costs (percentage of Capital Improvement Costs)				
Engineering	15%			$2,148,234.00
Legal/Administrative	5%			$716,078.00
Contract Admin/Construction Management	10%			$1,432,156.00
Contingency	25%			$3,580,391.00
Subtotal Other Costs				**$7,876,859.00**
Total Capital Improvement Costs				**$22,222,949.00**

Master Plan Operation and Maintenance Cost Summary

Description	Quantity	Unit	Unit Cost	Total Annual Cost
Culvert Maintenance (e.g. sediment & debris removal, erosion at entrance/exit, structural repairs,	2350	L.F.	$1.00	$1,175.00
Channel Maintenance (e.g. sediment & debris removal, erosion, tree & weed removal, etc.)	3500	L.F.	$2.00	$3,500.00
Detention/WQ Maintenance (e.g. sediment & debris removal, mucking out, tree & weed removal, s	15	ACRE	$1,790.00	$5,370.00
Total Annual Operation and Maintenance Cost				**$10,045.00**
Effective Interest Rate				0.00%
Total Operation and Maintenance Costs Over 50 Years				**$502,250.00**

MASTER PLAN COST ESTIMATE FOR INDIVIDUAL REACH

PROJECT :	Milliken Master Plan - 100-Year Conveyance without Detention
DRAINAGEWAY :	Western Tributary
REACH :	Western Tributary
JURISDICTION :	Milliken
REACH ID:	West-ReachWestern Tributary TGM DATE : 9/1/2014

DESCRIPTION			QUANTITY	UNIT	UNIT COST	TOTAL COST	USER COMMENTS
Pipe Culverts and Storm Drains							
Circular Pipes							
Diameter (in)	Length (ft)	No. of Barrels					
60-inch	150	1	150	L.F.	$286.00	$42,900.00	Crossing of Hillsboro Canal
60-inch	100	1	100	L.F.	$286.00	$28,600.00	Crossing of Green St
60-inch	100	1	100	L.F.	$286.00	$28,600.00	Crossing of Broad St
Headwalls							
Diameter (in)	Applicable	No. of Barrels					
60-inch	Yes	1	2	EA	$1,930.42	$3,861.00	
60-inch	Yes	1	2	EA	$1,930.42	$3,861.00	
60-inch	Yes	1	2	EA	$1,930.42	$3,861.00	
Wingwalls (includes concrete apron)							
Diameter (in)		No. of Barrels					
60-inch		1	2	EA	$10,706.05	$21,412.00	
60-inch		1	2	EA	$10,706.05	$21,412.00	
60-inch		1	2	EA	$10,706.05	$21,412.00	
Hydraulic Structures							
Sloping Drop Structures							
Height (ft)	Bottom Width (ft)	Yn (ft)					
5	10	5	4	EA	$85,622.99	$342,492.00	
Channel Improvements							
12-inch Riprap, Type M			200	C.Y.	$71.00	$14,200.00	culvert protection
Excavation, Low Range			27000	C.Y.	$13.00	$351,000.00	Western Outfall Channel
Soil Riprap, Type M			100	C.Y.	$83.00	$8,300.00	overflow protection @ Beeline Ditch crossing
Landscaping and Maintenance Improvements							
Reclamation & seeding (native grasses)			9	ACRE	$1,190.00	$10,710.00	
Special Items (User Defined)							
Beeline Ditch Crossing	<----User Defined Items		500	C.Y.	$13.00	$6,500.00	overflow weir of Beeline Ditch @ outfall channel
Land Acquisition							
Easement/ROW Acquisition			8.78	ACRE	$1,193.50	$10,479.00	Purvis & Binder easements

Master Plan Capital Improvement Cost Summary

Capital Improvement Costs				
Pipe Culverts and Storm Drains				$175,919.00
Concrete Box Culverts				$0.00
Hydraulic Structures				$342,492.00
Channel Improvements				$373,500.00
Detention/Water Quality Facilities				$0.00
Removals				$0.00
Landscaping and Maintenance Improvements				$10,710.00
Special Items (User Defined)				$6,500.00
Subtotal Capital Improvement Costs				**$909,121.00**
Additional Capital Improvement Costs				
Dewatering	$15,950.00	L.S.		$15,950.00
Mobilization	5%			$45,456.00
Traffic Control	$10,000.00	L.S.		$10,000.00
Utility Coordination/Relocation	$20,000.00	L.S.		$20,000.00
Stormwater Management/Erosion Control	5%			$45,456.00
Subtotal Additional Capital Improvement Costs				**$136,862.00**
Land Acquisition Costs				
ROW/Easements				$10,479.00
Subtotal Land Acquisition Costs				**$10,479.00**
Other Costs (percentage of Capital Improvement Costs)				
Engineering	15%			$156,897.00
Legal/Administrative	5%			$52,299.00
Contract Admin/Construction Management	10%			$104,598.00
Contingency	25%			$261,496.00
Subtotal Other Costs				**$575,290.00**
Total Capital Improvement Costs				**$1,631,752.00**

Master Plan Operation and Maintenance Cost Summary

Description	Quantity	Unit	Unit Cost	Total Annual Cost
Culvert Maintenance (e.g. sediment & debris removal, erosion at entrance/exit, structural repairs,	300	L.F.	$1.00	$150.00
Hydraulic Structure Maintenance (e.g. debris removal, erosion, structural repairs, etc.)	4	EA	$600.00	$1,200.00
Channel Maintenance (e.g. sediment & debris removal, erosion, tree & weed removal, etc.)	3400	L.F.	$2.00	$3,400.00
Total Annual Operation and Maintenance Cost				**$4,750.00**
Effective Interest Rate				0.00%
Total Operation and Maintenance Costs Over 50 Years				**$237,500.00**

MASTER PLAN COST ESTIMATE FOR INDIVIDUAL REACH

PROJECT :	Milliken Master Plan - 100-Year Conveyance without Detention
DRAINAGEWAY :	Lola Park Tributary
REACH :	Lola
JURISDICTION :	Milliken
REACH ID:	Lola-ReachLola TGM DATE : 9/1/2014

DESCRIPTION			QUANTITY	UNIT	UNIT COST	TOTAL COST	USER COMMENTS
Pipe Culverts and Storm Drains							
Circular Pipe							
Diameter (in)	Length (ft)	No. of Barrels					
60-inch	400	1	400	L.F.	$286.00	$114,400.00	CR42
36-inch	250	1	250	L.F.	$129.00	$32,250.00	Forest Street
54-inch	75	1	75	L.F.	$257.00	$19,275.00	Elm Street (equivalent to existing HERCP's)
Flare End Sections							
Diameter (in)	Applicable	No. of Barrels					
36-inch	Yes	1	2	EA	$1,920.00	$3,840.00	
Headwalls							
Diameter (in)	Applicable	No. of Barrels					
60-inch	Yes	1	2	EA	$1,930.42	$3,861.00	
54-inch	Yes	1	2	EA	$1,737.31	$3,475.00	
Wingwalls (includes concrete apron)							
Diameter (in)		No. of Barrels					
60-inch		1	2	EA	$10,706.05	$21,412.00	
54-inch		1	2	EA	$10,529.78	$21,060.00	
Concrete Box Culverts							
Box Culvert Pipe							
Individual Box Span (ft)	Box Height (ft)	No. of Barrels	Length (ft)				
7	4	2	75	L.F.	$1,450.54	$108,790.00	CR44
8	5	5	100	L.F.	$4,150.14	$415,014.00	S. Quentine
11	5	1	525	L.F.	$1,074.60	$564,164.00	Pheasant Hills outlet, Hillsboro crossing structure
10	6	1	200	L.F.	$1,103.24	$220,649.00	CR46 @ Irene
12	7	1	200	L.F.	$1,352.88	$270,576.00	alice crossing
6	4	2	225	L.F.	$1,336.32	$300,672.00	Fire Station
7	4	2	160	L.F.	$1,450.54	$232,086.00	Broad Street
7	4	2	450	L.F.	$1,450.54	$652,741.00	Josephine outfall
4	2	13	100	L.F.	$5,711.84	$571,184.00	Platte/Thompson Crossing
Headwall and Toewalls							
Individual Box Span (ft)	No. of Barrels	Total Span (ft)					
7	2	17.00	2	EA	$1,433.73	$2,867.00	
8	5	45.00	2	EA	$3,814.43	$7,629.00	
11	1	13.00	2	EA	$1,181.23	$2,362.00	
10	1	12.00	2	EA	$1,090.37	$2,181.00	
12	1	14.00	2	EA	$1,263.11	$2,526.00	
6	2	15.00	2	EA	$1,265.06	$2,530.00	
7	2	17.00	1	EA	$1,433.73	$1,434.00	
4	13	64.00	1	EA	$5,178.43	$5,178.00	
Wingwalls (includes wingwalls on either side of channel and concrete apron)							
Individual Box Span (ft)	Box Rise (ft)	No. of Barrels					
7	4	2	2	EA	$9,377.90	$18,755.80	
8	5	5	2	EA	$18,579.62	$37,159.20	
11	5	1	2	EA	$11,058.60	$22,117.20	
10	6	1	2	EA	$13,662.62	$27,325.20	
12	7	1	2	EA	$15,951.55	$31,903.10	
6	4	2	2	EA	$8,956.93	$17,913.90	
7	4	2	1	EA	$9,377.90	$9,377.90	
4	2	13	1	EA	$15,839.32	$15,839.30	
Hydraulic Structures							
Sloping Drop Structures							
Height (ft)	Bottom Width (ft)	Yn (ft)					
12	40	5	1	EA	$221,947.29	$221,947.00	Drop into Pheasant Hills Pond
Channel Improvements							
Excavation, Low Range			7500	C.Y.	$13.00	$97,500.00	Josephine outfall
Excavation, Low Range			111000	C.Y.	$13.00	$1,443,000.00	Pheasant Hills Outfall
Soil Riprap, Type M			200	C.Y.	$83.00	$16,600.00	Outfall channels
Soil Riprap, Type M			500	C.Y.	$83.00	$41,500.00	Armoring for CR44 overflow
Detention/Water Quality Facilities							
Detention (User Entered Quantities)							
Outlet Works			1	EA	$50,000.00	$50,000.00	Pheasant Hills Pond Outlet
Special Items (User Defined)							
Platte/Thompson Transition Structure	<----User Defined Items		75	CY	$800.00	$60,000.00	
Boring 3-54" Pipes under UPRR	<----User Defined Items		3	EA	$450,000.00	$1,350,000.00	
Broad Street Trainsition	<----User Defined Items		75	CY	$800.00	$60,000.00	
Raise Pheasant Hills berm	<----User Defined Items		3000	CY	$20.00	$60,000.00	
Land Acquisition							
Easement/ROW Acquisition			23.60	ACRE	$89.50	$2,112.00	

Master Plan Capital Improvement Cost Summary

Capital Improvement Costs					
Pipe Culverts and Storm Drains				$219,573.00	
Concrete Box Culverts				$3,542,975.00	
Hydraulic Structures				$221,947.00	
Channel Improvements				$1,598,600.00	
Detention/Water Quality Facilities				$50,000.00	
Removals				$0.00	
Landscaping and Maintenance Improvements				$0.00	
Special Items (User Defined)				$1,530,000.00	
Subtotal Capital Improvement Costs				**$7,163,095.00**	
Additional Capital Improvement Costs					
Dewatering	$12,334.00	L.S.		$12,334.00	
Mobilization	5%			$358,155.00	
Traffic Control	$20,000.00	L.S.		$20,000.00	
Utility Coordination/Relocation	$200,000.00	L.S.		$200,000.00	
Stormwater Management/Erosion Control	5%			$358,155.00	
Subtotal Additional Capital Improvement Costs				**$948,644.00**	
Land Acquisition Costs					
ROW/Easements				$2,112.00	
Subtotal Land Acquisition Costs				**$2,112.00**	
Other Costs (percentage of Capital Improvement Costs)					
Engineering	15%			$1,216,761.00	
Legal/Administrative	5%			$406,587.00	
Contract Admin/Construction Management	10%			$811,174.00	
Contingency	25%			$2,027,935.00	
Subtotal Other Costs				**$4,461,457.00**	
Total Capital Improvement Costs				**$12,575,308.00**	

Master Plan Operation and Maintenance Cost Summary

Description	Quantity	Unit	Unit Cost	Total Annual Cost	
Culvert Maintenance (e.g. sediment & debris removal, erosion at entrance/exit, structural repairs, e	3680	L.F.	$1.00	$1,840.00	
Channel Maintenance (e.g. sediment & debris removal, erosion, tree & weed removal, etc.)	7300	L.F.	$2.00	$7,300.00	
Total Annual Operation and Maintenance Cost				**$9,140.00**	
Effective Interest Rate				0.00%	
Total Operation and Maintenance Costs Over 50 Years				**$457,000.00**	

MASTER PLAN COST ESTIMATE FOR INDIVIDUAL REACH

PROJECT :	Milliken Master Plan - 100-Year Conveyance without Detention
DRAINAGEWAY :	Eastern Tributary
REACH :	Eastern Tributary
JURISDICTION :	Milliken
REACH ID:	East-ReachEastern Tributary TGM DATE : 9/1/2014

DESCRIPTION			QUANTITY	UNIT	UNIT COST	TOTAL COST	USER COMMENTS
Concrete Box Culverts							
Box Culvert Pipe							
Individual Box Span (ft)	Box Height (ft)	No. of Barrels	Length (ft)				
8	5	1	300	L.F.	$830.03	$249,008.00	Centennial Farms @ Alice
5	4	4	100	L.F.	$2,444.21	$244,421.00	CR46
7	5	8	100	L.F.	$6,267.57	$626,757.00	Broad St
8	4	4	100	L.F.	$3,133.78	$313,378.00	Cherry St
8	4	5	130	L.F.	$3,917.23	$509,240.00	CR48
8	4	4	100	L.F.	$3,133.78	$313,378.00	Alice North
8	4	5	80	L.F.	$3,917.23	$313,378.00	Platte/Thompson Ditch
Headwall and Toewalls							
Individual Box Span (ft)	No. of Barrels	Total Span (ft)					
8	1	10.00	2	EA	$847.65	$1,695.00	
5	4	24.00	2	EA	$1,941.91	$3,884.00	
7	8	64.00	2	EA	$5,397.57	$10,795.00	
8	4	36.00	2	EA	$3,051.54	$6,103.00	
8	5	45.00	2	EA	$3,814.43	$7,629.00	
8	4	36.00	2	EA	$3,051.54	$6,103.00	
Wingwalls (includes wingwalls on either side of channel and concrete apron)							
Individual Box Span (ft)	Box Rise (ft)	No. of Barrels					
8	5	1	2	EA	$10,353.50	$20,707.00	
5	4	4	2	EA	$11,061.74	$22,123.50	
7	5	8	2	EA	$23,045.23	$46,090.50	
8	4	4	2	EA	$13,587.52	$27,175.00	
8	4	5	2	EA	$15,271.36	$30,542.70	
8	4	4	2	EA	$13,587.52	$27,175.00	
Channel Improvements							
Excavation, Low Range			14900	C.Y.	$13.00	$193,700.00	Ehrlich Pond Outfall
Excavation, Low Range			6500	C.Y.	$13.00	$84,500.00	Centennial Farms outfall
Removals							
Removal of culvert pipe (48"<D<84")			400	L.F.	$60.00	$24,000.00	
Landscaping and Maintenance Improvements							
Reclamation & seeding (native grasses)			4	ACRE	$1,190.00	$4,760.00	
Special Items (User Defined)							
Boring new Ehrlich Outlet	<----User Defined Items		11	EA	$400,000.00	$4,400,000.00	11-48" steel pipes
Land Acquisition							
Easement/ROW Acquisition			3.70	ACRE	$2,601.00	$9,624.00	

Master Plan Capital Improvement Cost Summary

Capital Improvement Costs					
Pipe Culverts and Storm Drains				$0.00	
Concrete Box Culverts				$2,779,583.00	
Hydraulic Structures				$0.00	
Channel Improvements				$278,200.00	
Detention/Water Quality Facilities				$0.00	
Removals				$24,000.00	
Landscaping and Maintenance Improvements				$4,760.00	
Special Items (User Defined)				$4,400,000.00	
Subtotal Capital Improvement Costs				**$7,486,543.00**	
Additional Capital Improvement Costs					
Dewatering	$13,016.00	L.S.		$13,016.00	
Mobilization	5%			$374,327.00	
Traffic Control	$20,000.00	L.S.		$20,000.00	
Utility Coordination/Relocation	$200,000.00	L.S.		$200,000.00	
Stormwater Management/Erosion Control	5%			$374,327.00	
Subtotal Additional Capital Improvement Costs				**$981,670.00**	
Land Acquisition Costs					
ROW/Easements				$9,624.00	
Subtotal Land Acquisition Costs				**$9,624.00**	
Other Costs (percentage of Capital Improvement Costs)					
Engineering	15%			$1,270,232.00	
Legal/Administrative	5%			$423,411.00	
Contract Admin/Construction Management	10%			$846,821.00	
Contingency	25%			$2,117,053.00	
Subtotal Other Costs				**$4,657,517.00**	
Total Capital Improvement Costs				**$13,135,354.00**	

Master Plan Operation and Maintenance Cost Summary

Description	Quantity	Unit	Unit Cost	Total Annual Cost	
Culvert Maintenance (e.g. sediment & debris removal, erosion at entrance/exit, structural repairs, e	3100	L.F.	$1.00	$1,550.00	
Channel Maintenance (e.g. sediment & debris removal, erosion, tree & weed removal, etc.)	1900	L.F.	$2.00	$1,900.00	
Total Annual Operation and Maintenance Cost				**$3,450.00**	
Effective Interest Rate				0.00%	
Total Operation and Maintenance Costs Over 50 Years				**$172,500.00**	

MASTER PLAN COST ESTIMATE FOR INDIVIDUAL REACH

PROJECT :	Milliken Master Plan - 100-Year Conveyance without Detention
DRAINAGEWAY :	Northern Tributary
REACH :	North
JURISDICTION :	Milliken
REACH ID:	North-ReachNorth TGM DATE : 9/1/2014

DESCRIPTION			QUANTITY	UNIT	UNIT COST	TOTAL COST	USER COMMENTS
Concrete Box Culverts							
Box Culvert Pipe							
Individual Box Span (ft)	Box Height (ft)	No. of Barrels	Length (ft)				
9	6	1	100	L.F.	$989.93	$98,993.00	Watershed 811
9	6	1	100	L.F.	$989.93	$98,993.00	Watershed 810
8	6	1	100	L.F.	$876.61	$87,661.00	Watershed 809
6	6	1	100	L.F.	$742.23	$74,223.00	Watershed 808
7	6	1	100	L.F.	$817.09	$81,709.00	Watershed 804
5	6	1	100	L.F.	$725.27	$72,527.00	Watershed 805
Headwall and Toewalls							
Individual Box Span (ft)	No. of Barrels	Total Span (ft)					
9	1	11.00	2	EA	$932.42	$1,865.00	
9	1	11.00	2	EA	$932.42	$1,865.00	
8	1	10.00	2	EA	$847.65	$1,695.00	
6	1	8.00	2	EA	$674.70	$1,349.00	
7	1	9.00	2	EA	$759.03	$1,518.00	
5	1	7.00	2	EA	$566.39	$1,133.00	
Wingwalls (includes wingwalls on either side of channel and concrete apron)							
Individual Box Span (ft)	Box Rise (ft)	No. of Barrels					
9	6	1	2	EA	$13,403.03	$26,806.10	
9	6	1	2	EA	$13,403.03	$26,806.10	
8	6	1	2	EA	$13,143.45	$26,286.90	
6	6	1	2	EA	$12,624.28	$25,248.60	
7	6	1	2	EA	$12,883.87	$25,767.70	
5	6	1	2	EA	$12,364.70	$24,729.40	
Channel Improvements							
Soil Riprap, Type M			250	C.Y.	$83.00	$20,750.00	
Landscaping and Maintenance Improvements							
Reclamation & seeding (native grasses)			1	ACRE	$1,190.00	$1,190.00	

Master Plan Capital Improvement Cost Summary

Capital Improvement Costs				
Pipe Culverts and Storm Drains			$0.00	
Concrete Box Culverts			$679,176.00	
Hydraulic Structures			$0.00	
Channel Improvements			$20,750.00	
Detention/Water Quality Facilities			$0.00	
Removals			$0.00	
Landscaping and Maintenance Improvements			$1,190.00	
Special Items (User Defined)			$0.00	
Subtotal Capital Improvement Costs			**$701,116.00**	
Additional Capital Improvement Costs				
Dewatering		L.S.	$0.00	
Mobilization	5%		$35,056.00	
Traffic Control		L.S.	$0.00	
Utility Coordination/Relocation		L.S.	$0.00	
Stormwater Management/Erosion Control	5%		$35,056.00	
Subtotal Additional Capital Improvement Costs			**$70,112.00**	
Land Acquisition Costs				
ROW/Easements			$0.00	
Subtotal Land Acquisition Costs			**$0.00**	
Other Costs (percentage of Capital Improvement Costs)				
Engineering	15%		$115,684.00	
Legal/Administrative	5%		$38,561.00	
Contract Admin/Construction Management	10%		$77,123.00	
Contingency	25%		$192,807.00	
Subtotal Other Costs			**$424,175.00**	
Total Capital Improvement Costs			**$1,195,403.00**	

Master Plan Operation and Maintenance Cost Summary

Description	Quantity	Unit	Unit Cost	Total Annual Cost	
Culvert Maintenance (e.g. sediment & debris removal, erosion at entrance/exit, structural repairs, e	600	L.F.	$1.00	$300.00	
Hydraulic Structure Maintenance (e.g. debris removal, erosion, structural repairs, etc.)	6	EA	$600.00	$1,800.00	
Total Annual Operation and Maintenance Cost				**$2,100.00**	
Effective Interest Rate				0.00%	
Total Operation and Maintenance Costs Over 50 Years				**$105,000.00**	

MASTER PLAN COST ESTIMATE FOR INDIVIDUAL REACH

PROJECT :	Milliken Master Plan - 100-Year Conveyance without Detention
DRAINAGEWAY :	Big Thompson Tributary
REACH :	Big Thompson
JURISDICTION :	Milliken
REACH ID:	Big Thompson-ReachBig Thompson TGM DATE : 9/1/2014

DESCRIPTION		QUANTITY	UNIT	UNIT COST	TOTAL COST	USER COMMENTS
Special Items (User Defined)						
36" Bore under UPRR	<----User Defined Items	1	LS	$350,000.00	$350,000.00	subwatershed 836

Master Plan Capital Improvement Cost Summary

Capital Improvement Costs				
Pipe Culverts and Storm Drains			$0.00	
Concrete Box Culverts			$0.00	
Hydraulic Structures			$0.00	
Channel Improvements			$0.00	
Detention/Water Quality Facilities			$0.00	
Removals			$0.00	
Landscaping and Maintenance Improvements			$0.00	
Special Items (User Defined)			$350,000.00	
Subtotal Capital Improvement Costs			**$350,000.00**	
Additional Capital Improvement Costs				
Dewatering		L.S.	$0.00	
Mobilization	5%		$17,500.00	
Traffic Control		L.S.	$0.00	
Utility Coordination/Relocation		L.S.	$0.00	
Stormwater Management/Erosion Control	5%		$17,500.00	
Subtotal Additional Capital Improvement Costs			**$35,000.00**	
Land Acquisition Costs				
ROW/Easements			$0.00	
Subtotal Land Acquisition Costs			**$0.00**	
Other Costs (percentage of Capital Improvement Costs)				
Engineering	15%		$57,750.00	
Legal/Administrative	5%		$19,250.00	
Contract Admin/Construction Management	10%		$38,500.00	
Contingency	25%		$96,250.00	
Subtotal Other Costs			**$211,750.00**	
Total Capital Improvement Costs				**$596,750.00**

Master Plan Operation and Maintenance Cost Summary

Description	Quantity	Unit	Unit Cost	Total Annual Cost	
Culvert Maintenance (e.g. sediment & debris removal, erosion at entrance/exit, structural repairs, e	110	L.F.	$1.00	$55.00	
Hydraulic Structure Maintenance (e.g. debris removal, erosion, structural repairs, etc.)	2	EA	$600.00	$600.00	
Total Annual Operation and Maintenance Cost				**$655.00**	
Effective Interest Rate				0.00%	
Total Operation and Maintenance Costs Over 50 Years				**$32,750.00**	

Table C.1 – Baseline Hydrology SWMM Input/Output

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)
--------------------------------------------------------------

INP file created on 6/18/2014 7:11:51 AM by jdeischer with inpPINS version 0.0.2.0
Title/Notes:

*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Flow Routing Method ...... KINWAVE
Starting Date ............ JUN-01-2014 00:00:00
Ending Date .............. JUN-02-2014 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Routing Time Step ........ 5.00 sec


WARNING 04: minimum elevation drop used for Conduit CE804

WARNING 04: minimum elevation drop used for Conduit D025

WARNING 04: minimum elevation drop used for Conduit D030

WARNING 04: minimum elevation drop used for Conduit D040

WARNING 08: elevation drop exceeds length for Conduit D330

WARNING 08: elevation drop exceeds length for Conduit L335

WARNING 02: maximum depth increased for Node 941

WARNING 02: maximum depth increased for Node 942

WARNING 02: maximum depth increased for Node 959

*************
Element Count
*************
Number of rain gages ...... 0
Number of subcatchments ... 0
Number of nodes ........... 201
Number of links ........... 202
Number of pollutants ...... 0
Number of land uses ....... 0


************
Node Summary
************
```

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
005	JUNCTION	4739.40	7.00	0.0	
015	JUNCTION	4746.20	7.50	0.0	
020	JUNCTION	4744.71	0.00	0.0	
025	JUNCTION	4742.88	0.00	0.0	
030	JUNCTION	4742.20	0.00	0.0	
040	JUNCTION	4742.17	0.00	0.0	
045	JUNCTION	4752.78	0.00	0.0	
100	JUNCTION	4763.70	5.00	0.0	
101	JUNCTION	4795.89	2.00	0.0	
102	JUNCTION	4792.00	2.00	0.0	
105	JUNCTION	4760.50	5.00	0.0	
115	JUNCTION	4857.00	10.00	0.0	
116	JUNCTION	4826.00	10.00	0.0	
117	JUNCTION	4828.00	10.00	0.0	
125	JUNCTION	4806.80	0.00	0.0	
135	JUNCTION	4890.00	10.00	0.0	
136	JUNCTION	4828.00	10.00	0.0	
137	JUNCTION	4839.00	10.00	0.0	
140	JUNCTION	4887.20	5.00	0.0	
145	JUNCTION	4890.30	5.00	0.0	
200	JUNCTION	4766.52	0.00	0.0	
205	JUNCTION	4751.00	2.00	0.0	
206	JUNCTION	4748.40	3.00	0.0	
215	JUNCTION	4771.20	0.00	0.0	
220	JUNCTION	4775.70	0.00	0.0	
300	JUNCTION	4721.60	10.00	0.0	
305	JUNCTION	4737.70	5.00	0.0	
320	JUNCTION	4750.40	4.00	0.0	
325	JUNCTION	4760.00	5.00	0.0	
330	JUNCTION	4754.50	0.00	0.0	
335	JUNCTION	4762.00	0.00	0.0	
340	JUNCTION	4758.20	0.00	0.0	
345	JUNCTION	4766.50	0.00	0.0	
350	JUNCTION	4767.80	5.00	0.0	
355	JUNCTION	4795.00	5.00	0.0	
360	JUNCTION	4810.00	5.00	0.0	
405	JUNCTION	4725.10	0.00	0.0	
415	JUNCTION	4731.50	0.00	0.0	
500	JUNCTION	4772.80	0.00	0.0	
505	JUNCTION	4790.00	5.00	0.0	
510	JUNCTION	4784.10	0.00	0.0	
600	JUNCTION	4738.50	0.00	0.0	
625	JUNCTION	4794.60	0.00	0.0	

Table C.1 – Baseline Hydrology SWMM Input/Output

630	JUNCTION	4803.80	5.00	0.0
635	JUNCTION	4859.80	5.00	0.0
640	JUNCTION	4908.70	5.00	0.0
650	JUNCTION	4773.50	0.00	0.0
655	JUNCTION	4779.30	5.00	0.0
660	JUNCTION	4795.10	5.00	0.0
665	JUNCTION	4861.30	5.00	0.0
675	JUNCTION	4800.50	0.00	0.0
803	JUNCTION	4777.50	0.00	0.0
804	JUNCTION	4712.10	5.00	0.0
805	JUNCTION	4777.30	5.00	0.0
806	JUNCTION	4734.50	0.00	0.0
807	JUNCTION	4733.10	5.00	0.0
808	JUNCTION	4725.40	0.00	0.0
809	JUNCTION	4724.50	0.00	0.0
810	JUNCTION	4721.80	0.00	0.0
811	JUNCTION	4712.90	5.00	0.0
812	JUNCTION	4759.00	5.00	0.0
813	JUNCTION	4760.50	0.00	0.0
814	JUNCTION	4729.80	0.00	0.0
815	JUNCTION	4770.10	5.00	0.0
818	JUNCTION	4716.10	5.00	0.0
821	JUNCTION	4765.10	0.00	0.0
824	JUNCTION	4731.90	0.00	0.0
825	JUNCTION	4738.10	0.00	0.0
834	JUNCTION	4734.00	0.00	0.0
835	JUNCTION	4715.60	0.00	0.0
836	JUNCTION	4736.90	0.00	0.0
837	JUNCTION	4727.10	0.00	0.0
838	JUNCTION	4724.60	0.00	0.0
900	JUNCTION	4750.33	6.00	0.0
902	JUNCTION	4746.33	12.00	0.0
903	JUNCTION	4733.31	12.00	0.0
904	JUNCTION	4737.20	10.00	0.0
905	JUNCTION	4743.28	5.00	0.0
906	JUNCTION	4749.74	5.00	0.0
910	JUNCTION	4788.00	5.00	0.0
915	JUNCTION	4725.30	5.00	0.0
917	JUNCTION	4797.90	5.00	0.0
918	JUNCTION	4785.40	15.00	0.0
920	JUNCTION	4856.00	10.00	0.0
922	JUNCTION	4756.40	10.00	0.0
925	JUNCTION	4739.90	3.00	0.0
926	JUNCTION	4744.00	5.00	0.0
927	JUNCTION	4745.56	10.00	0.0
928	JUNCTION	4800.71	5.00	0.0
929	JUNCTION	4801.58	6.00	0.0
930	JUNCTION	4744.59	4.00	0.0
931	JUNCTION	4746.62	20.00	0.0
933	JUNCTION	4729.78	11.00	0.0
935	JUNCTION	4726.81	10.00	0.0
937	JUNCTION	4728.79	10.00	0.0
939	JUNCTION	4733.63	10.00	0.0
945	JUNCTION	4744.45	5.00	0.0
946	JUNCTION	4743.32	6.00	0.0
947	JUNCTION	4743.27	6.00	0.0
949	JUNCTION	4741.36	12.00	0.0
956	JUNCTION	4751.00	5.00	0.0
958	JUNCTION	4742.13	8.09	0.0
960	JUNCTION	4743.32	7.23	0.0
PRV	JUNCTION	4870.00	10.00	0.0
L137_Pond	JUNCTION	4834.00	5.00	0.0
970	JUNCTION	4850.00	5.00	0.0
972	JUNCTION	4798.20	5.00	0.0
974	JUNCTION	4802.00	5.00	0.0
130	JUNCTION	4808.00	5.00	0.0
977	JUNCTION	4804.00	4.00	0.0
120	JUNCTION	4806.00	5.00	0.0
981	JUNCTION	4804.00	5.00	0.0
225	JUNCTION	4824.00	5.00	0.0
982	JUNCTION	4795.00	4.50	0.0
983	JUNCTION	4787.00	10.00	0.0
984	JUNCTION	4788.00	5.00	0.0
985	JUNCTION	4779.80	10.00	0.0
986	JUNCTION	4783.00	5.00	0.0
987	JUNCTION	4750.00	5.00	0.0
988	JUNCTION	4779.10	4.00	0.0
989	JUNCTION	4780.00	4.00	0.0
110	JUNCTION	4790.00	5.00	0.0
990	JUNCTION	4776.00	5.00	0.0
991	JUNCTION	4738.00	0.00	0.0
BT001	OUTFALL	4779.20	0.00	0.0
BT005	OUTFALL	4773.40	0.00	0.0
BT010	OUTFALL	4794.50	0.00	0.0
BT015	OUTFALL	4738.40	0.00	0.0
BT020	OUTFALL	4738.00	0.00	0.0
BT025	OUTFALL	4731.80	0.00	0.0
BT030	OUTFALL	4765.00	0.00	0.0
BT035	OUTFALL	4721.50	0.00	0.0
BT040	OUTFALL	4716.00	0.00	0.0
BT045	OUTFALL	4729.70	0.00	0.0
BT046	OUTFALL	4724.50	0.00	0.0
BT047	OUTFALL	4727.00	0.00	0.0
BT055	OUTFALL	4715.50	5.00	0.0
BT060	OUTFALL	4712.80	0.00	0.0
BT065	OUTFALL	4721.70	0.00	0.0
BT070	OUTFALL	4724.40	0.00	0.0
BT075	OUTFALL	4725.30	0.00	0.0
BT080	OUTFALL	4712.10	0.00	0.0
BT085	OUTFALL	4684.80	5.00	0.0
LT001	OUTFALL	4752.60	0.00	0.0
LT005	OUTFALL	4741.00	0.00	0.0
LT010	OUTFALL	4740.20	0.00	0.0
LT015	OUTFALL	4738.33	6.00	0.0
LT020	OUTFALL	4729.00	5.00	0.0
SPR001	OUTFALL	4731.60	1.00	0.0
SPR005	OUTFALL	4737.90	3.00	0.0
SPR010	OUTFALL	4736.80	0.00	0.0
IRR_RETURN	OUTFALL	4741.75	2.00	0.0
001	DIVIDER	4733.81	12.00	0.0

Table C.1 – Baseline Hydrology SWMM Input/Output

010	DIVIDER	4746.29	4.00	0.0
951	DIVIDER	4742.88	11.02	0.0
952	DIVIDER	4742.20	12.60	0.0
953	DIVIDER	4742.17	14.63	0.0
210	DIVIDER	4758.60	2.00	0.0
310	DIVIDER	4730.18	11.00	0.0
901	DIVIDER	4747.25	9.56	0.0
916	DIVIDER	4744.74	10.00	0.0
919	DIVIDER	4740.52	8.80	0.0
923	DIVIDER	4757.26	5.00	0.0
932	DIVIDER	4746.61	20.00	0.0
934	DIVIDER	4728.20	10.00	0.0
936	DIVIDER	4729.32	10.00	0.0
938	DIVIDER	4734.40	10.00	0.0
940	DIVIDER	4768.92	8.00	0.0
941	DIVIDER	4761.90	8.60	0.0
942	DIVIDER	4765.24	8.00	0.0
943	DIVIDER	4767.57	8.00	0.0
948	DIVIDER	4744.55	12.00	0.0
CL_Outlet	DIVIDER	4731.70	12.20	0.0
950	DIVIDER	4752.81	9.00	0.0
957	DIVIDER	4745.97	10.00	0.0
959	DIVIDER	4743.69	10.72	0.0
944	DIVIDER	4757.24	12.00	0.0
976	DIVIDER	4801.79	10.00	0.0
978	DIVIDER	4801.71	5.00	0.0
225_SPLIT	DIVIDER	4792.40	4.50	0.0
LOLA_DIVERSION	DIVIDER	4772.20	6.00	0.0
115_Pond	STORAGE	4850.00	7.00	0.0
116_POND	STORAGE	4798.20	7.00	0.0
117_POND	STORAGE	4802.00	7.00	0.0
120_POND	STORAGE	4804.00	7.00	0.0
130_POND	STORAGE	4804.00	5.00	0.0
137_Pond	STORAGE	4834.00	10.00	0.0
225_POND	STORAGE	4795.00	5.00	0.0
335_POND	STORAGE	4750.00	10.00	0.0
355_POND	STORAGE	4788.00	8.00	0.0
360_POND	STORAGE	4783.00	5.00	0.0
Centennial	STORAGE	4725.00	12.00	0.0
CF	STORAGE	4760.00	5.52	0.0
Ehrlich	STORAGE	4740.00	13.00	0.0
PH	STORAGE	4782.00	15.00	0.0
PlatteRiverVillagePond	STORAGE	4870.00	10.00	0.0
SV_S	STORAGE	4731.00	7.00	0.0
505_POND	STORAGE	4780.00	5.00	0.0
110_POND	STORAGE	4776.00	5.00	0.0
325_POND	STORAGE	4751.00	5.00	0.0
836_POND	STORAGE	4738.00	10.00	0.0

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Link Summary
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Name	From Node	To Node	Type	Length	%Slope	Roughness
CE001	001	903	CONDUIT	83.0	0.6024	0.0160
CE001_OF	001	903	CONDUIT	85.0	0.5882	0.0400
CE405	405	Centennial	CONDUIT	10.0	1.0001	0.0400
CE415	415	SV_S	CONDUIT	10.0	5.0063	0.0400
CE500	500	LT010	CONDUIT	470.0	6.9529	0.0100
CE505	988	LT005	CONDUIT	1772.0	2.1506	0.0100
CE510	510	LT001	CONDUIT	1000.0	3.1516	0.0100
CE600	600	BT015	CONDUIT	100.0	0.1000	0.0100
CE625	625	BT010	CONDUIT	100.0	0.1000	0.0100
CE630	630	625	CONDUIT	100.0	9.2392	0.0400
CE635	635	630	CONDUIT	2120.0	2.6424	0.0400
CE640	640	630	CONDUIT	2771.0	3.7884	0.0400
CE650	650	BT005	CONDUIT	100.0	0.1000	0.0100
CE655	655	BT001	CONDUIT	100.0	0.1000	0.0100
CE660	660	910	CONDUIT	287.0	2.4746	0.0400
CE665	665	660	CONDUIT	2393.0	2.7675	0.0100
CE675	675	910	CONDUIT	100.0	12.5988	0.0400
CE803	803	805	CONDUIT	100.0	0.2000	0.0400
CE804	804	BT080	CONDUIT	100.0	0.0010	0.0100
CE805	805	BT085	CONDUIT	2405.0	3.8490	0.0400
CE806	806	807	CONDUIT	100.0	1.4001	0.0400
CE807	807	804	CONDUIT	2738.0	0.7670	0.0400
CE808	808	BT075	CONDUIT	100.0	0.1000	0.0100
CE809	809	BT070	CONDUIT	100.0	0.1000	0.0100
CE810	810	BT065	CONDUIT	100.0	0.1000	0.0100
CE811	811	BT060	CONDUIT	100.0	0.1000	0.0100
CE813	813	812	CONDUIT	100.0	1.5002	0.0100
CE814	814	BT045	CONDUIT	100.0	0.1000	0.0100
CE815	815	818	CONDUIT	4103.0	1.3162	0.0400
CE818	818	BT040	CONDUIT	100.0	0.1000	0.0100
CE821	821	BT030	CONDUIT	100.0	0.1000	0.0100
CE824	824	BT025	CONDUIT	100.0	0.1000	0.0100
CE825	825	BT020	CONDUIT	100.0	0.1000	0.0100
CE834	834	Centennial	CONDUIT	100.0	9.0367	0.0100
CE835	835	BT055	CONDUIT	10.0	1.0001	0.0100
CE837	837	BT047	CONDUIT	10.0	1.0001	0.0100
CE838	838	BT046	CONDUIT	100.0	0.1000	0.0100
CE910	910	655	CONDUIT	1067.0	0.8154	0.0400
CE911	812	811	CONDUIT	3487.0	1.3222	0.0400
CE915	915	BT055	CONDUIT	1025.0	0.9561	0.0400
CL_Out	CL_Outlet	915	CONDUIT	680.0	0.9412	0.0160
CL_Spill	CL_Outlet	SPR001	CONDUIT	100.0	11.3728	0.0400
D020	020	916	CONDUIT	10.0	-0.3000	0.0100
D025	025	951	CONDUIT	10.0	0.0100	0.0100
D030	030	952	CONDUIT	10.0	0.0100	0.0100
D040	040	953	CONDUIT	10.0	0.0100	0.0100
D200	200	944	CONDUIT	10.0	249.0739	0.0100
D215	215	941	CONDUIT	10.0	253.0202	0.0100
D220	220	943	CONDUIT	10.0	139.6275	0.0100
D330	330	Ehrlich	CONDUIT	10.0	145.0000	0.0100
L335	335	335_POND	CONDUIT	10.0	120.0000	0.0100
D340	340	923	CONDUIT	10.0	9.4418	0.0100
D345	345	CF	CONDUIT	10.0	85.5337	0.0100
LOLA_SPILL	LOLA_DIVERSION	956	CONDUIT	3521.0	0.6305	0.0400
E300	300	BT035	CONDUIT	10.0	1.0001	0.0100

Table C.1 – Baseline Hydrology SWMM Input/Output

E305	305	300	CONDUIT	400.0	4.0283	0.0400	L901_OF	901	931	CONDUIT	70.0	0.9000	0.0200
E310	310	933	CONDUIT	80.0	0.5000	0.0300	L902	902	916	CONDUIT	173.0	2.0756	0.0400
E310_OF	310	933	CONDUIT	80.0	0.5000	0.0160	L903	903	LT020	CONDUIT	559.0	0.7710	0.0400
E320	320	Ehrlich	CONDUIT	122.0	8.5557	0.0200	L905	905	001	CONDUIT	1205.0	0.7859	0.0200
E350	350	CF	CONDUIT	1140.0	0.6842	0.0200	L916	916	905	CONDUIT	100.0	1.4602	0.0160
E355	983	985	CONDUIT	1630.0	0.4417	0.0400	L916_OF	916	905	CONDUIT	100.0	1.4602	0.0200
E360	985	922	CONDUIT	2018.0	1.1596	0.0400	L918	918	LOLA_DIVERSION	CONDUIT	1968.0	0.6707	0.0400
E904	904	938	CONDUIT	400.0	0.7000	0.0160	L920	920	136	CONDUIT	4889.0	0.5727	0.0400
E906	906	904	CONDUIT	1000.0	1.2541	0.0160	L926	926	001	CONDUIT	1264.0	0.8062	0.0400
E922	922	957	CONDUIT	1877.0	0.5557	0.0400	L928	928	917	CONDUIT	663.0	0.4238	0.0400
E923	923	922	CONDUIT	455.0	0.1890	0.0160	L929	929	978	CONDUIT	444.0	0.1959	0.0400
E923_OF	923	922	CONDUIT	455.0	1.0682	0.0400	L930	930	926	CONDUIT	120.0	0.4917	0.0400
E927	927	948	CONDUIT	1545.0	0.0654	0.0400	L931	931	932	CONDUIT	55.0	0.0182	0.0400
E933	933	936	CONDUIT	380.0	0.1211	0.0160	L932	932	902	CONDUIT	160.0	0.1750	0.0220
E934	934	935	CONDUIT	130.0	1.0693	0.0300	L932_OF	932	902	CONDUIT	160.0	0.1750	0.0200
E934_OF	934	935	CONDUIT	130.0	1.0693	0.0300	L950	950	900	CONDUIT	281.0	0.8826	0.0160
E935	935	300	CONDUIT	1850.0	0.2816	0.0160	L950_OF	950	900	CONDUIT	234.0	2.7703	0.0200
E936	936	937	CONDUIT	40.0	1.3251	0.0160	L951	951	952	CONDUIT	551.0	0.1234	0.0160
E936_OF	936	937	CONDUIT	40.0	1.3251	0.0300	L951_OF	951	005	CONDUIT	1022.0	0.9296	0.0200
E937	937	934	CONDUIT	375.0	0.1573	0.0160	L952	952	953	CONDUIT	356.0	0.0084	0.0160
E938	938	939	CONDUIT	30.0	2.5675	0.0160	L952_OF	952	005	CONDUIT	1241.0	0.8381	0.0200
E938_OF	938	939	CONDUIT	30.0	2.5675	0.0300	L953	953	IRR_RETURN	CONDUIT	607.0	0.0692	0.0160
E939	939	310	CONDUIT	340.0	1.0148	0.0400	L953_OF	953	005	CONDUIT	1374.0	0.9025	0.0200
E948	948	949	CONDUIT	330.0	0.9667	0.0160	Q210	210	944	CONDUIT	55.0	2.4735	0.0160
E948_OF	948	949	CONDUIT	330.0	0.9667	0.0400	Q210_OF	210	944	CONDUIT	50.0	2.7210	0.0200
E956	956	Ehrlich	CONDUIT	500.0	2.2005	0.0200	Q225	225_SPLIT	940	CONDUIT	1190.0	1.9735	0.0200
E957	957	927	CONDUIT	100.0	0.4100	0.0160	Q225_OF	225_SPLIT	941	CONDUIT	2723.0	1.1202	0.0200
E957_OF	957	927	CONDUIT	100.0	0.4100	0.0200	Q919	919	LT015	CONDUIT	115.0	1.9047	0.0160
E958	958	904	CONDUIT	915.0	0.5388	0.0160	Q919_OF	919	LT015	CONDUIT	115.0	4.3432	0.0400
E959	959	960	CONDUIT	190.0	0.1947	0.0160	Q940	940	943	CONDUIT	673.0	0.2006	0.0120
E959_OF	959	906	CONDUIT	400.0	0.1675	0.0400	Q940_OF	940	943	CONDUIT	760.0	0.1776	0.0400
E960	960	958	CONDUIT	300.0	0.3967	0.0160	Q941	941	944	CONDUIT	2074.0	0.2247	0.0120
Eh_In	949	Ehrlich	CONDUIT	10.0	13.7275	0.0100	Q941_OF	941	944	CONDUIT	2074.0	0.2247	0.0400
L010	010	930	CONDUIT	90.0	1.8892	0.0160	Q942	942	941	CONDUIT	595.0	0.5614	0.0120
L010_OF	010	930	CONDUIT	90.0	1.8892	0.0200	Q942_OF	942	941	CONDUIT	595.0	0.5614	0.0400
L015	015	001	CONDUIT	877.0	1.6981	0.0400	Q943	943	942	CONDUIT	570.0	0.4088	0.0120
L019	005	001	CONDUIT	885.0	0.8577	0.0400	Q943_OF	943	942	CONDUIT	570.0	0.4088	0.0400
L045_OF	045	950	CONDUIT	10.0	-0.3000	0.0100	Q944	944	945	CONDUIT	680.0	1.8812	0.0160
L100	100	950	CONDUIT	1526.0	0.7136	0.0400	Q945	945	946	CONDUIT	400.0	0.2825	0.0400
L105	105	950	CONDUIT	376.0	2.0456	0.0400	Q946	946	947	CONDUIT	105.0	0.0476	0.0160
LOLA	LOLA_DIVERSION	105	CONDUIT	2369.0	0.4939	0.0400	Q947	947	919	CONDUIT	40.0	6.8913	0.0400
L917	917	PH	CONDUIT	1126.0	1.4122	0.0400	SPR836	991	SPR010	CONDUIT	110.0	1.0910	0.0150
980	978	928	CONDUIT	50.0	2.0004	0.0160	SPR925	925	SPR005	CONDUIT	110.0	1.8185	0.0160
980_OF	978	928	CONDUIT	50.0	2.0004	0.0200	944_OF	944	945	CONDUIT	650.0	3.5083	0.0350
L125	125	976	CONDUIT	636.0	0.7878	0.0400	L137	137	137_Pond	CONDUIT	1415.0	0.3534	0.0400
L976	976	929	CONDUIT	50.0	0.4200	0.0160	L136	136	976	CONDUIT	3443.0	0.7613	0.0400
L130_OF	976	917	CONDUIT	820.0	0.4744	0.0400	L115	115	115_Pond	CONDUIT	1145.0	0.6114	0.0400
L135	135	PlatteRiverVillagePondCONDUIT		2814.0	0.7108		L116	116	116_POND	CONDUIT	1700.0	1.6355	0.0400
0.0400							L117	117	117_POND	CONDUIT	1832.0	1.4194	0.0400
L140	140	920	CONDUIT	2733.0	1.1417	0.0400	L988	101	102	CONDUIT	400.0	0.9725	0.0100
L145	145	920	CONDUIT	4036.0	0.8499	0.0400	48	102	100	CONDUIT	3717.0	0.7614	0.0250
L205	205	926	CONDUIT	200.0	3.5021	0.0200	49	PRV	920	CONDUIT	2666.0	0.5251	0.0400
L206	206	010	CONDUIT	330.0	0.6394	0.0400	921	L137_Pond	136	CONDUIT	300.0	2.0004	0.0100
L900	900	901	CONDUIT	288.0	1.0695	0.0400	971	970	116	CONDUIT	3347.0	0.7171	0.0400
L901	901	931	CONDUIT	75.0	0.8400	0.0160	973	972	917	CONDUIT	200.0	0.1500	0.0400

Table C.1 – Baseline Hydrology SWMM Input/Output

975	974	917	CONDUIT	300.0	1.3668	0.0400
L130	130	130_POND	CONDUIT	1584.0	0.2525	0.0400
978	977	976	CONDUIT	200.0	1.1051	0.0130
L120	120	120_POND	CONDUIT	600.0	0.3333	0.0400
982	981	978	CONDUIT	400.0	0.5725	0.0100
L225	225	225_POND	CONDUIT	3141.0	0.9233	0.0400
L982	982	225_SPLIT	CONDUIT	900.0	0.2889	0.0130
L355	355	355_POND	CONDUIT	400.0	1.7503	0.0100
L984	984	983	CONDUIT	520.0	0.1923	0.0400
L360	360	360_POND	CONDUIT	3453.0	0.7820	0.0400
L986	986	985	CONDUIT	300.0	1.0667	0.0400
L987	987	957	CONDUIT	400.0	1.0076	0.0100
L505	505	505_POND	CONDUIT	1010.0	0.9901	0.0400
51	989	988	CONDUIT	200.0	0.4500	0.0130
L110	110	110_POND	CONDUIT	1150.0	1.2175	0.0400
L990	990	LOLA_DIVERSION	CONDUIT	200.0	1.9003	0.0400
L325	325	325_POND	CONDUIT	400.0	2.2506	0.0100
52	836	836_POND	CONDUIT	400.0	-0.2750	0.0100
PH_Weir	PH	918	WEIR			
Centennial_Out	Centennial	CL_Outlet	OUTLET			
CF_OUT	CF	923	OUTLET			
EL_OUT	Ehrlich	959	OUTLET			
SV_S_Outlet	SV_S	925	OUTLET			
PRV_OUT	PlatteRiverVillagePondPRV		OUTLET			
137_Out	137_Pond	L137_Pond	OUTLET			
115_Out	115_Pond	970	OUTLET			
116_OUT	116_POND	972	OUTLET			
117_OUT	117_POND	974	OUTLET			
130_OUT	130_POND	977	OUTLET			
120_OUT	120_POND	981	OUTLET			
225_OUT	225_POND	982	OUTLET			
355_OUT	355_POND	984	OUTLET			
360_OUT	360_POND	986	OUTLET			
335_OUT	335_POND	987	OUTLET			
505_OUT	505_POND	989	OUTLET			
110_OUT	110_POND	990	OUTLET			
325_OUT	325_POND	956	OUTLET			
836_OUT	836_POND	991	OUTLET			

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Cross Section Summary
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Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
CE001	CIRCULAR	4.50	15.90	1.13	4.50	2	124.01
CE001_OF	TRAPEZOIDAL	6.00	2436.00	5.84	412.00	1	22514.55
CE405	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE415	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE500	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE505	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE510	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE600	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE625	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE630	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE635	TRAPEZOIDAL	5.00	400.00	3.07	130.00	1	5097.10
CE640	TRAPEZOIDAL	5.00	400.00	3.07	130.00	1	6103.04
CE650	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE655	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE660	TRAPEZOIDAL	5.00	175.00	2.87	60.00	1	2065.08
CE665	TRAPEZOIDAL	5.00	400.00	3.07	130.00	1	20865.17
CE675	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE803	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE804	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE805	TRAPEZOIDAL	5.00	110.00	2.54	42.00	1	1494.25
CE806	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE807	TRAPEZOIDAL	5.00	175.00	2.87	60.00	1	1149.69
CE808	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE809	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE810	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE811	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE813	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE814	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE815	TRAPEZOIDAL	5.00	175.00	2.87	60.00	1	1506.08
CE818	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE821	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE824	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE825	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE834	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE835	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE837	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE838	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE910	TRAPEZOIDAL	5.00	175.00	2.87	60.00	1	1185.41
CE911	TRAPEZOIDAL	5.00	200.00	2.82	70.00	1	1705.21
CE915	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	881.28
CL_Out	CIRCULAR	1.50	1.77	0.38	1.50	1	8.28
CL_Spill	TRAPEZOIDAL	1.00	135.00	0.57	235.00	1	1168.76
D020	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D025	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D030	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D040	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D200	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D215	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D220	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D330	DUMMY	0.00	0.00	0.00	0.00	1	0.00
L335	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D340	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D345	DUMMY	0.00	0.00	0.00	0.00	1	0.00
LOLA_SPILL	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	2896.57
E300	DUMMY	0.00	0.00	0.00	0.00	1	0.00
E305	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	7321.41
E310	CIRCULAR	4.00	12.57	1.00	4.00	1	44.01
E310_OF	TRAPEZOIDAL	3.00	510.00	1.59	320.00	1	4569.30
E320	TRAPEZOIDAL	4.00	1680.00	2.05	820.00	1	58894.70
E350	TRAPEZOIDAL	5.00	550.00	2.62	210.00	1	6417.55
E355	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	4536.19
E360	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	7349.85
E904	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	14276.13
E906	TRAPEZOIDAL	5.00	175.00	2.87	60.00	1	3675.26

Table C.1 – Baseline Hydrology SWMM Input/Output

E922	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	5087.80
E923	HORIZ_ELLIPSE	3.00	11.42	0.92	5.00	1	43.58
E923_OF	TRAPEZOIDAL	1.00	70.00	0.58	120.00	1	187.62
E927	TRAPEZOIDAL	10.00	450.00	5.15	85.00	1	1273.88
E933	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	5936.68
E934	CIRCULAR	5.00	19.63	1.25	5.00	1	116.70
E934_OF	TRAPEZOIDAL	3.00	510.00	1.59	320.00	1	3563.76
E935	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	9055.03
E936	CIRCULAR	4.50	15.90	1.13	4.50	1	183.93
E936_OF	TRAPEZOIDAL	3.00	510.00	1.59	320.00	1	3967.23
E937	TRAPEZOIDAL	10.00	500.00	5.41	90.00	1	5674.80
E938	CIRCULAR	4.00	12.57	1.00	4.00	1	187.01
E938_OF	TRAPEZOIDAL	3.00	510.00	1.59	320.00	1	5522.26
E939	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	6875.39
E948	CIRCULAR	4.00	12.57	1.00	4.00	1	114.75
E948_OF	TRAPEZOIDAL	5.00	550.00	2.62	210.00	1	3814.06
E956	TRAPEZOIDAL	5.00	2600.00	2.55	1020.00	1	53472.11
E957	HORIZ_ELLIPSE	3.00	11.42	0.92	5.00	2	64.18
E957_OF	TRAPEZOIDAL	2.00	220.00	1.05	210.00	1	1079.49
E958	CIRCULAR	4.00	12.57	1.00	4.00	1	85.67
E959	CIRCULAR	4.00	12.57	1.00	4.00	1	51.50
E959_OF	TRAPEZOIDAL	4.00	880.00	2.09	420.00	1	2190.53
E960	CIRCULAR	4.00	12.57	1.00	4.00	1	73.51
Eh_In	DUMMY	0.00	0.00	0.00	0.00	1	0.00
L010	CIRCULAR	1.50	1.77	0.38	1.50	1	11.73
L010_OF	TRAPEZOIDAL	1.00	70.00	0.58	120.00	1	499.03
L015	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	4753.51
L019	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	3378.26
L045_OF	DUMMY	0.00	0.00	0.00	0.00	1	0.00
L100	TRAPEZOIDAL	5.00	110.00	2.54	42.00	1	643.42
L105	TRAPEZOIDAL	5.00	110.00	2.54	42.00	1	1089.34
LOLA	TRAPEZOIDAL	2.50	16.25	1.47	9.00	1	54.79
L917	DUMMY	0.00	0.00	0.00	0.00	1	0.00
980	CIRCULAR	3.50	9.62	0.88	3.50	1	115.62
980_OF	TRAPEZOIDAL	1.00	70.00	0.58	120.00	1	513.50
L125	DUMMY	0.00	0.00	0.00	0.00	1	0.00
L976	CIRCULAR	2.00	3.14	0.50	2.00	1	11.91
L130_OF	TRAPEZOIDAL	5.00	550.00	2.62	210.00	1	2671.84
L135	TRAPEZOIDAL	10.00	1000.00	6.58	150.00	1	10997.46
L140	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	3897.69
L145	TRAPEZOIDAL	5.00	500.00	3.32	150.00	1	3812.70
L205	TRAPEZOIDAL	2.00	100.00	1.11	90.00	1	1490.53
L206	TRAPEZOIDAL	3.00	150.00	1.58	95.00	1	603.36
L900	CE900	6.00	258.00	2.27	112.00	1	1713.05
L901	HORIZ_ELLIPSE	3.67	17.09	1.12	5.50	2	157.25
L901_OF	TRAPEZOIDAL	5.00	750.00	3.00	250.00	1	10989.34
L902	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	9833.03
L903	TRAPEZOIDAL	5.00	200.00	3.27	60.00	1	1436.26
L905	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	6467.76
L916	HORIZ_ELLIPSE	3.60	16.45	1.10	5.70	2	196.94
L916_OF	TRAPEZOIDAL	1.00	70.00	0.58	120.00	1	438.72
L918	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	2987.55
L920	TRAPEZOIDAL	5.00	475.00	2.79	170.00	1	2645.36
L926	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	3275.34
L928	TRAPEZOIDAL	5.00	362.50	2.67	135.00	1	1688.58

L929	TRAPEZOIDAL	5.00	110.00	2.54	42.00	1	337.15
L930	TRAPEZOIDAL	2.00	50.00	1.11	45.00	1	139.31
L931	TRAPEZOIDAL	20.00	1800.00	10.29	170.00	1	4265.78
L932	RECT_OPEN	3.00	30.00	1.88	10.00	1	128.90
L932_OF	TRAPEZOIDAL	2.00	240.00	1.09	220.00	1	790.42
L950	CIRCULAR	4.50	15.90	1.13	4.50	2	150.11
L950_OF	TRAPEZOIDAL	5.00	600.00	2.72	220.00	1	14473.05
L951	CIRCULAR	2.00	3.14	0.50	2.00	1	6.46
L951_OF	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	7034.15
L952	CIRCULAR	2.00	3.14	0.50	2.00	1	1.69
L952_OF	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	6678.89
L953	CIRCULAR	2.00	3.14	0.50	2.00	1	4.83
L953_OF	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	6930.94
Q210	CIRCULAR	2.00	3.14	0.50	2.00	1	28.91
Q210_OF	TRAPEZOIDAL	1.00	60.00	0.55	110.00	1	490.86
Q225	TRAPEZOIDAL	2.50	137.50	1.31	105.00	1	1716.49
Q225_OF	TRAPEZOIDAL	2.50	137.50	1.31	105.00	1	1293.19
Q919	CIRCULAR	4.00	12.57	1.00	4.00	2	161.07
Q919_OF	TRAPEZOIDAL	1.00	150.00	0.60	250.00	1	826.12
Q940	CIRCULAR	2.50	4.91	0.63	2.50	1	19.90
Q940_OF	TRAPEZOIDAL	5.00	150.00	2.93	50.00	1	480.67
Q941	CIRCULAR	5.00	19.63	1.25	5.00	1	133.74
Q941_OF	TRAPEZOIDAL	5.00	110.00	2.54	42.00	1	361.03
Q942	CIRCULAR	4.00	12.57	1.00	4.00	1	116.59
Q942_OF	TRAPEZOIDAL	5.00	150.00	2.93	50.00	1	854.49
Q943	CIRCULAR	3.00	7.07	0.75	3.00	1	46.20
Q943_OF	TRAPEZOIDAL	5.00	150.00	2.93	50.00	1	729.17
Q944	HORIZ_ELLIPSE	4.00	20.31	1.22	6.33	1	296.06
Q945	TRAPEZOIDAL	5.00	150.00	2.93	50.00	1	606.18
Q946	RECT_CLOSED	6.00	60.00	1.88	10.00	2	184.90
Q947	TRAPEZOIDAL	5.00	150.00	2.93	50.00	1	2993.91
SPR836	DUMMY	0.00	0.00	0.00	0.00	1	0.00
SPR925	CIRCULAR	3.00	7.07	0.75	3.00	1	73.08
944_OF	TRAPEZOIDAL	2.00	26.00	1.21	21.00	1	234.75
L137	TRAPEZOIDAL	10.00	1000.00	6.58	150.00	1	7754.29
L136	TRAPEZOIDAL	10.00	1000.00	6.58	150.00	1	11381.65
L115	TRAPEZOIDAL	10.00	1100.00	5.21	210.00	1	9606.80
L116	TRAPEZOIDAL	10.00	700.00	5.74	120.00	1	10659.97
L117	TRAPEZOIDAL	10.00	500.00	5.41	90.00	1	6817.82
L988	TRAPEZOIDAL	2.00	12.00	1.10	10.00	1	186.99
48	TRAPEZOIDAL	1.50	57.00	1.02	56.00	1	298.70
49	TRAPEZOIDAL	10.00	1000.00	6.58	150.00	1	9453.02
921	TRAPEZOIDAL	5.00	150.00	2.93	50.00	1	6452.19
971	TRAPEZOIDAL	5.00	175.00	2.87	60.00	1	1111.64
973	TRAPEZOIDAL	5.00	150.00	2.93	50.00	1	441.71
975	TRAPEZOIDAL	5.00	150.00	2.93	50.00	1	1333.34
L130	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	452.90
978	CIRCULAR	4.00	12.57	1.00	4.00	1	151.00
L120	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	520.35
982	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	2727.75
L225	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	866.02
L982	CIRCULAR	4.50	15.90	1.13	4.50	2	105.70
L355	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	4769.42
L984	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	395.23
L360	TRAPEZOIDAL	5.00	150.00	2.93	50.00	1	1008.51

Table C.1 – Baseline Hydrology SWMM Input/Output

L986	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	930.85
L987	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	3618.65
L505	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	896.82
51	CIRCULAR	4.00	12.57	1.00	4.00	1	96.36
L110	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	994.45
L990	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	1242.42
L325	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	5408.28
52	DUMMY	0.00	0.00	0.00	0.00	1	0.00

```
****************
Transect Summary
****************

Transect CE900
Area:
          0.0049    0.0102    0.0160    0.0222    0.0288
          0.0359    0.0435    0.0515    0.0599    0.0688
          0.0782    0.0880    0.0982    0.1089    0.1200
          0.1316    0.1436    0.1561    0.1690    0.1823
          0.1961    0.2104    0.2251    0.2402    0.2558
          0.2719    0.2883    0.3053    0.3226    0.3405
          0.3587    0.3775    0.3966    0.4166    0.4384
          0.4621    0.4879    0.5155    0.5452    0.5767
          0.6103    0.6458    0.6832    0.7226    0.7640
          0.8073    0.8525    0.8997    0.9489    1.0000
Hrad:
          0.0502    0.0963    0.1392    0.1797    0.2182
          0.2551    0.2906    0.3251    0.3586    0.3913
          0.4234    0.4548    0.4857    0.5162    0.5463
          0.5761    0.6055    0.6346    0.6635    0.6922
          0.7207    0.7490    0.7771    0.8050    0.8329
          0.8606    0.8882    0.9156    0.9430    0.9703
          0.9975    1.0246    1.0516    1.0289    0.9917
          0.9643    0.9447    0.9312    0.9227    0.9183
          0.9174    0.9193    0.9237    0.9302    0.9385
          0.9484    0.9596    0.9720    0.9855    1.0000
Width:
          0.0979    0.1064    0.1150    0.1236    0.1321
          0.1407    0.1493    0.1579    0.1664    0.1750
          0.1836    0.1921    0.2007    0.2093    0.2179
          0.2264    0.2350    0.2436    0.2521    0.2607
          0.2693    0.2779    0.2864    0.2950    0.3036
          0.3121    0.3207    0.3293    0.3379    0.3464
          0.3550    0.3636    0.3721    0.4000    0.4375
          0.4750    0.5125    0.5500    0.5875    0.6250
          0.6625    0.7000    0.7375    0.7750    0.8125
          0.8500    0.8875    0.9250    0.9625    1.0000


*************************        Volume         Volume
Flow Routing Continuity        acre-feet       10^6 gal
*************************     ---------      ---------
Dry Weather Inflow .......         0.000          0.000
Wet Weather Inflow .......         0.000          0.000
Groundwater Inflow .......         0.000          0.000
RDII Inflow ..............         0.000          0.000
External Inflow ..........      1710.663        557.445
External Outflow .........      1506.510        490.919
Internal Outflow .........         0.000          0.000
Storage Losses ...........         0.000          0.000
Initial Stored Volume ....         0.000          0.000
Final Stored Volume ......       214.376         69.857
Continuity Error (%) .....        -0.598


*******************************
Highest Flow Instability Indexes
*******************************
Link 225_OUT (23)
Link L982 (21)
Link Q225_OF (11)
Link Q225 (9)
Link Q940 (7)


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     5.00 sec
Average Time Step           :     5.00 sec
Maximum Time Step           :     5.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     1.00


******************
Node Depth Summary
******************

----------------------------------------------------------------------
                                Average  Maximum  Maximum  Time of Max
                                  Depth    Depth      HGL   Occurrence
Node                 Type         Feet     Feet     Feet  days hr:min
----------------------------------------------------------------------
005                  JUNCTION     2.08     3.62  4743.02     0  00:38
015                  JUNCTION     2.53     3.09  4749.29     0  00:40
020                  JUNCTION     0.00     0.00  4744.71     0  00:00
025                  JUNCTION     0.00     0.00  4742.88     0  00:00
030                  JUNCTION     0.00     0.00  4742.20     0  00:00
040                  JUNCTION     0.00     0.00  4742.17     0  00:00
045                  JUNCTION     0.00     0.00  4752.78     0  00:00
100                  JUNCTION     0.25     3.33  4767.03     0  00:47
101                  JUNCTION     0.05     0.86  4796.75     0  00:40
102                  JUNCTION     0.05     0.86  4792.86     0  00:40
105                  JUNCTION     1.12     2.50  4763.00     0  00:57
115                  JUNCTION     0.07     1.71  4858.71     0  00:35
116                  JUNCTION     0.17     1.71  4827.71     0  00:35
117                  JUNCTION     0.09     2.51  4830.51     0  00:35
```

Table C.1 – Baseline Hydrology SWMM Input/Output

125	JUNCTION	0.00	0.00	4806.80	0	00:00
135	JUNCTION	0.11	2.26	4892.26	0	00:40
136	JUNCTION	0.52	3.67	4831.67	0	01:36
137	JUNCTION	0.14	2.81	4841.81	0	00:40
140	JUNCTION	0.25	2.19	4889.39	0	01:10
145	JUNCTION	0.15	1.36	4891.66	0	01:10
200	JUNCTION	0.00	0.00	4766.52	0	00:00
205	JUNCTION	0.01	0.24	4751.24	0	00:35
206	JUNCTION	0.03	0.56	4748.96	0	00:40
215	JUNCTION	0.00	0.00	4771.20	0	00:00
220	JUNCTION	0.00	0.00	4775.70	0	00:00
300	JUNCTION	1.36	4.84	4726.44	0	03:06
305	JUNCTION	0.03	0.78	4738.48	0	00:35
320	JUNCTION	0.01	0.26	4750.66	0	00:40
325	JUNCTION	0.08	1.66	4761.66	0	00:40
330	JUNCTION	0.00	0.00	4754.50	0	00:00
335	JUNCTION	0.00	0.00	4762.00	0	00:00
340	JUNCTION	0.00	0.00	4758.20	0	00:00
345	JUNCTION	0.00	0.00	4766.50	0	00:00
350	JUNCTION	0.04	0.87	4768.67	0	00:40
355	JUNCTION	0.11	2.20	4797.20	0	00:45
360	JUNCTION	0.16	3.23	4813.23	0	00:40
405	JUNCTION	0.00	0.00	4725.10	0	00:00
415	JUNCTION	0.00	0.00	4731.50	0	00:00
500	JUNCTION	0.00	0.00	4772.80	0	00:00
505	JUNCTION	0.15	2.62	4792.62	0	00:45
510	JUNCTION	0.00	0.00	4784.10	0	00:00
600	JUNCTION	0.00	0.00	4738.50	0	00:00
625	JUNCTION	0.00	0.00	4794.60	0	00:00
630	JUNCTION	0.10	1.42	4805.22	0	00:56
635	JUNCTION	0.10	1.42	4861.22	0	00:50
640	JUNCTION	0.02	0.43	4909.13	0	00:40
650	JUNCTION	0.00	0.00	4773.50	0	00:00
655	JUNCTION	0.57	4.79	4784.09	0	01:12
660	JUNCTION	0.14	2.01	4797.11	0	00:50
665	JUNCTION	0.03	0.39	4861.69	0	00:50
675	JUNCTION	0.00	0.00	4800.50	0	00:00
803	JUNCTION	0.00	0.00	4777.50	0	00:00
804	JUNCTION	0.28	2.71	4714.81	0	01:10
805	JUNCTION	0.34	2.77	4780.07	0	01:00
806	JUNCTION	0.00	0.00	4734.50	0	00:00
807	JUNCTION	0.27	2.72	4735.82	0	01:05
808	JUNCTION	0.00	0.00	4725.40	0	00:00
809	JUNCTION	0.00	0.00	4724.50	0	00:00
810	JUNCTION	0.00	0.00	4721.80	0	00:00
811	JUNCTION	0.37	2.84	4715.74	0	01:21
812	JUNCTION	0.35	2.85	4761.85	0	01:10
813	JUNCTION	0.00	0.00	4760.50	0	00:00
814	JUNCTION	0.00	0.00	4729.80	0	00:00
815	JUNCTION	0.36	3.00	4773.10	0	01:15
818	JUNCTION	0.38	2.98	4719.08	0	01:22
821	JUNCTION	0.00	0.00	4765.10	0	00:00
824	JUNCTION	0.00	0.00	4731.90	0	00:00
825	JUNCTION	0.00	0.00	4738.10	0	00:00
834	JUNCTION	0.00	0.00	4734.00	0	00:00
835	JUNCTION	0.00	0.00	4715.60	0	00:00
836	JUNCTION	0.00	0.00	4736.90	0	00:00
837	JUNCTION	0.00	0.00	4727.10	0	00:00
838	JUNCTION	0.00	0.00	4724.60	0	00:00
900	JUNCTION	0.79	4.50	4754.83	0	00:46
902	JUNCTION	3.36	4.56	4750.89	0	00:59
903	JUNCTION	6.02	6.59	4739.90	0	00:49
904	JUNCTION	2.01	3.96	4741.16	0	03:01
905	JUNCTION	4.01	4.42	4747.70	0	00:58
906	JUNCTION	0.68	3.51	4753.25	0	03:01
910	JUNCTION	0.57	4.79	4792.79	0	01:10
915	JUNCTION	0.93	0.95	4726.25	0	01:13
917	JUNCTION	0.72	4.46	4802.36	0	01:42
918	JUNCTION	0.75	3.76	4789.16	0	02:21
920	JUNCTION	0.44	3.43	4859.43	0	01:25
922	JUNCTION	1.04	3.86	4760.26	0	01:29
925	JUNCTION	0.47	0.58	4740.48	0	01:11
926	JUNCTION	0.05	1.06	4745.06	0	00:37
927	JUNCTION	5.38	8.10	4753.66	0	01:31
928	JUNCTION	0.48	3.50	4804.21	0	00:46
929	JUNCTION	1.57	2.31	4803.89	0	00:27
930	JUNCTION	3.00	3.21	4747.80	0	00:36
931	JUNCTION	4.67	7.51	4754.13	0	00:58
933	JUNCTION	8.40	9.95	4739.73	0	03:02
935	JUNCTION	3.03	5.00	4731.81	0	00:33
937	JUNCTION	7.20	8.99	4737.78	0	03:03
939	JUNCTION	7.17	8.74	4742.37	0	03:02
945	JUNCTION	0.43	3.21	4747.66	0	01:11
946	JUNCTION	0.44	3.51	4746.83	0	01:13
947	JUNCTION	0.42	3.51	4746.78	0	01:13
949	JUNCTION	7.21	9.42	4750.78	0	01:40
956	JUNCTION	0.59	3.77	4754.77	0	02:37
958	JUNCTION	2.10	2.64	4744.77	0	01:59
960	JUNCTION	3.14	4.00	4747.32	0	01:59
PRV	JUNCTION	0.16	1.73	4871.73	0	01:20
L137_Pond	JUNCTION	0.11	1.28	4835.28	0	01:17
970	JUNCTION	0.12	1.22	4851.22	0	01:08
972	JUNCTION	0.37	2.80	4801.00	0	01:14
974	JUNCTION	0.12	1.68	4803.68	0	00:59
130	JUNCTION	0.20	3.16	4811.16	0	00:45
977	JUNCTION	0.25	2.24	4806.24	0	01:26
120	JUNCTION	0.17	3.54	4809.54	0	00:40
981	JUNCTION	0.08	1.36	4805.36	0	01:00
225	JUNCTION	0.25	3.01	4827.01	0	00:55
982	JUNCTION	0.33	3.04	4798.04	0	01:38
983	JUNCTION	0.70	4.29	4791.29	0	01:24
984	JUNCTION	0.69	4.29	4792.29	0	01:22
985	JUNCTION	0.47	3.10	4782.90	0	01:27
986	JUNCTION	0.30	2.71	4785.71	0	01:19
987	JUNCTION	0.17	1.62	4751.62	0	01:11
988	JUNCTION	0.33	3.15	4782.25	0	01:22
989	JUNCTION	0.33	3.15	4783.15	0	01:22
110	JUNCTION	0.13	2.87	4792.87	0	00:40
990	JUNCTION	0.19	1.72	4777.72	0	01:15
991	JUNCTION	0.00	0.00	4738.00	0	00:00

Table C.1 – Baseline Hydrology SWMM Input/Output

BT001	OUTFALL	0.00	0.00	4779.20	0	00:00
BT005	OUTFALL	0.00	0.00	4773.40	0	00:00
BT010	OUTFALL	0.00	0.00	4794.50	0	00:00
BT015	OUTFALL	0.00	0.00	4738.40	0	00:00
BT020	OUTFALL	0.00	0.00	4738.00	0	00:00
BT025	OUTFALL	0.00	0.00	4731.80	0	00:00
BT030	OUTFALL	0.00	0.00	4765.00	0	00:00
BT035	OUTFALL	0.00	0.00	4721.50	0	00:00
BT040	OUTFALL	0.00	0.00	4716.00	0	00:00
BT045	OUTFALL	0.00	0.00	4729.70	0	00:00
BT046	OUTFALL	0.00	0.00	4724.50	0	00:00
BT047	OUTFALL	0.00	0.00	4727.00	0	00:00
BT055	OUTFALL	0.46	0.47	4715.97	0	02:44
BT060	OUTFALL	0.00	0.00	4712.80	0	00:00
BT065	OUTFALL	0.00	0.00	4721.70	0	00:00
BT070	OUTFALL	0.00	0.00	4724.40	0	00:00
BT075	OUTFALL	0.00	0.00	4725.30	0	00:00
BT080	OUTFALL	0.00	0.00	4712.10	0	00:00
BT085	OUTFALL	0.34	2.77	4687.57	0	01:05
LT001	OUTFALL	0.00	0.00	4752.60	0	00:00
LT005	OUTFALL	0.00	0.00	4741.00	0	00:00
LT010	OUTFALL	0.00	0.00	4740.20	0	00:00
LT015	OUTFALL	5.00	5.00	4743.33	0	00:00
LT020	OUTFALL	0.54	3.54	4732.54	0	00:50
SPR001	OUTFALL	0.00	0.00	4731.60	0	00:00
SPR005	OUTFALL	0.47	0.58	4738.48	0	04:09
SPR010	OUTFALL	0.00	0.00	4736.80	0	00:00
IRR_RETURN	OUTFALL	0.16	2.00	4743.75	0	00:28
001	DIVIDER	6.02	6.59	4740.40	0	00:49
010	DIVIDER	3.00	3.21	4749.50	0	00:36
951	DIVIDER	6.03	6.51	4749.39	0	00:35
952	DIVIDER	7.63	8.29	4750.49	0	00:40
953	DIVIDER	9.64	9.98	4752.15	0	00:35
210	DIVIDER	0.09	2.00	4760.60	0	00:31
310	DIVIDER	8.40	9.95	4740.13	0	03:02
901	DIVIDER	4.57	4.95	4752.20	0	00:58
916	DIVIDER	4.01	4.42	4749.16	0	00:58
919	DIVIDER	7.80	7.80	4748.32	0	00:00
923	DIVIDER	4.00	4.47	4761.73	0	01:21
932	DIVIDER	3.51	7.51	4754.12	0	00:59
934	DIVIDER	3.06	5.86	4734.06	0	03:04
936	DIVIDER	7.20	8.99	4738.31	0	03:03
938	DIVIDER	7.17	8.74	4743.14	0	03:02
940	DIVIDER	3.17	4.93	4773.85	0	01:43
941	DIVIDER	3.78	6.29	4768.19	0	01:31
942	DIVIDER	3.12	4.50	4769.74	0	00:51
943	DIVIDER	3.21	4.93	4772.50	0	01:48
948	DIVIDER	7.21	9.42	4753.97	0	01:39
CL_Outlet	DIVIDER	11.20	11.20	4742.90	0	00:00
950	DIVIDER	4.01	4.50	4757.31	0	00:42
957	DIVIDER	5.34	6.81	4752.78	0	01:30
959	DIVIDER	7.39	10.23	4753.92	0	02:58
944	DIVIDER	10.00	10.00	4767.24	0	00:00
976	DIVIDER	0.97	4.46	4806.25	0	01:39
978	DIVIDER	0.67	3.50	4805.21	0	00:44
225_SPLIT	DIVIDER	0.33	3.04	4795.44	0	01:40
LOLA_DIVERSION	DIVIDER	1.70	4.79	4776.99	0	02:26
115_Pond	STORAGE	0.66	5.47	4855.47	0	01:08
116_POND	STORAGE	0.61	5.38	4803.58	0	01:14
117_POND	STORAGE	0.39	5.15	4807.15	0	00:59
120_POND	STORAGE	0.15	2.80	4806.80	0	01:00
130_POND	STORAGE	0.41	3.22	4807.22	0	01:26
137_Pond	STORAGE	0.50	5.76	4839.76	0	01:17
225_POND	STORAGE	0.37	3.99	4798.99	0	01:38
335_POND	STORAGE	0.63	6.65	4756.65	0	01:11
355_POND	STORAGE	0.86	5.22	4793.22	0	01:22
360_POND	STORAGE	0.61	4.62	4787.62	0	01:19
Centennial	STORAGE	4.06	4.74	4729.74	0	02:27
CF	STORAGE	3.20	5.51	4765.51	0	01:21
Ehrlich	STORAGE	8.54	12.11	4752.11	0	02:58
PH	STORAGE	10.48	14.48	4796.48	0	02:21
PlatteRiverVillagePond	STORAGE	0.70	6.38	4876.38	0	01:20
SV_S	STORAGE	1.10	1.61	4732.61	0	02:08
505_POND	STORAGE	0.44	3.75	4783.75	0	01:22
110_POND	STORAGE	0.43	4.04	4780.04	0	01:15
325_POND	STORAGE	0.43	4.36	4755.36	0	01:18
836_POND	STORAGE	0.45	3.49	4741.49	0	01:10

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Node Inflow Summary
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Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal
005	JUNCTION	125.51	188.29	0	00:38	1.846	3.155
015	JUNCTION	23.80	23.80	0	00:40	0.490	0.490
020	JUNCTION	104.71	104.71	0	00:40	2.075	2.075
025	JUNCTION	29.32	29.32	0	00:35	0.414	0.414
030	JUNCTION	42.26	42.26	0	00:40	0.834	0.834
040	JUNCTION	13.83	13.83	0	00:35	0.267	0.267
045	JUNCTION	36.28	36.28	0	00:45	0.931	0.931
100	JUNCTION	199.60	231.52	0	00:47	4.431	6.124
101	JUNCTION	31.34	31.34	0	00:40	0.752	0.752
102	JUNCTION	34.76	65.85	0	00:40	0.877	1.629
105	JUNCTION	84.29	138.32	0	00:57	3.066	15.887
115	JUNCTION	138.23	138.23	0	00:35	2.171	2.171
116	JUNCTION	276.26	276.26	0	00:35	4.475	6.696
117	JUNCTION	308.65	308.65	0	00:35	4.296	4.296
125	JUNCTION	360.40	360.40	0	01:15	20.286	20.286
135	JUNCTION	664.74	664.74	0	00:40	14.550	14.550
136	JUNCTION	362.81	1639.46	0	01:36	14.109	82.956
137	JUNCTION	689.17	689.17	0	00:40	15.660	15.660
140	JUNCTION	465.15	465.15	0	01:10	21.154	21.154
145	JUNCTION	321.06	321.06	0	01:10	16.120	16.120
200	JUNCTION	41.77	41.77	0	00:45	1.169	1.169

Table C.1 – Baseline Hydrology SWMM Input/Output

205	JUNCTION	15.40	15.40	0	00:35	0.258	0.258	904	JUNCTION	0.00	1618.78	0	03:01	0.000	114.877
206	JUNCTION	10.92	10.92	0	00:40	0.257	0.257	905	JUNCTION	0.00	487.88	0	00:47	0.000	25.086
215	JUNCTION	59.15	59.15	0	00:50	1.804	1.804	906	JUNCTION	0.00	1567.33	0	03:01	0.000	87.989
220	JUNCTION	100.07	100.07	0	00:40	2.110	2.110	910	JUNCTION	0.00	1073.34	0	01:10	0.000	51.487
300	JUNCTION	39.51	1628.65	0	03:06	2.054	121.112	915	JUNCTION	0.00	6.00	0	01:13	0.000	3.782
305	JUNCTION	70.23	70.23	0	00:35	1.084	1.084	917	JUNCTION	0.00	2260.66	0	01:39	0.000	122.998
320	JUNCTION	76.03	76.03	0	00:40	1.778	1.778	918	JUNCTION	0.00	1427.50	0	02:21	0.000	84.671
325	JUNCTION	441.14	441.14	0	00:40	8.685	8.685	920	JUNCTION	0.00	1089.33	0	01:25	0.000	52.482
330	JUNCTION	389.31	389.31	0	00:35	4.942	4.942	922	JUNCTION	0.00	544.99	0	01:29	0.000	28.365
335	JUNCTION	775.43	775.43	0	00:40	13.060	13.060	925	JUNCTION	0.00	6.00	0	01:11	0.000	2.623
340	JUNCTION	20.75	20.75	0	00:50	0.701	0.701	926	JUNCTION	0.00	46.46	0	00:36	0.000	0.844
345	JUNCTION	109.56	109.56	0	00:40	2.012	2.012	927	JUNCTION	0.00	750.30	0	01:31	0.000	41.443
350	JUNCTION	95.62	95.62	0	00:40	1.903	1.903	928	JUNCTION	0.00	158.86	0	01:01	0.000	7.003
355	JUNCTION	712.33	712.33	0	00:45	15.018	15.018	929	JUNCTION	0.00	12.88	0	00:27	0.000	2.649
360	JUNCTION	388.70	388.70	0	00:40	8.548	8.548	930	JUNCTION	0.00	31.41	0	00:36	0.000	0.586
405	JUNCTION	695.99	695.99	0	00:35	10.812	10.812	931	JUNCTION	0.00	391.47	0	00:58	0.000	22.990
415	JUNCTION	336.37	336.37	0	00:35	4.514	4.514	933	JUNCTION	0.00	1618.74	0	03:02	0.000	118.082
500	JUNCTION	42.53	42.53	0	00:40	0.894	0.894	935	JUNCTION	0.00	1618.66	0	03:04	0.000	118.047
505	JUNCTION	197.99	197.99	0	00:45	4.666	4.666	937	JUNCTION	0.00	1618.70	0	03:03	0.000	118.067
510	JUNCTION	59.15	59.15	0	01:00	2.586	2.586	939	JUNCTION	0.00	1618.77	0	03:02	0.000	114.871
600	JUNCTION	207.65	207.65	0	00:50	6.639	6.639	945	JUNCTION	0.00	230.29	0	01:11	0.000	15.401
625	JUNCTION	156.23	798.66	0	00:51	4.822	24.235	946	JUNCTION	0.00	230.24	0	01:13	0.000	15.403
630	JUNCTION	258.51	644.11	0	00:51	5.031	19.413	947	JUNCTION	0.00	230.23	0	01:13	0.000	15.403
635	JUNCTION	395.70	395.70	0	00:50	13.163	13.163	949	JUNCTION	0.00	739.33	0	01:40	0.000	41.479
640	JUNCTION	56.32	56.32	0	00:40	1.141	1.141	956	JUNCTION	0.00	1471.08	0	02:36	0.000	85.974
650	JUNCTION	100.96	100.96	0	00:40	2.144	2.144	958	JUNCTION	0.00	56.89	0	01:59	0.000	26.915
655	JUNCTION	58.54	1112.39	0	01:11	1.518	53.011	960	JUNCTION	0.00	55.71	0	01:59	0.000	26.925
660	JUNCTION	135.63	283.58	0	00:50	3.160	8.568	PRV	JUNCTION	0.00	357.18	0	01:20	0.000	14.736
665	JUNCTION	162.91	162.91	0	00:50	5.399	5.399	L137_Pond	JUNCTION	0.00	390.42	0	01:17	0.000	15.718
675	JUNCTION	857.42	857.42	0	01:15	42.919	42.919	970	JUNCTION	0.00	56.54	0	01:08	0.000	2.179
803	JUNCTION	157.56	157.56	0	01:10	8.587	8.587	972	JUNCTION	0.00	126.32	0	01:14	0.000	6.709
804	JUNCTION	426.68	430.32	0	00:35	5.837	18.640	974	JUNCTION	0.00	136.72	0	00:59	0.000	4.308
805	JUNCTION	195.84	340.90	0	01:00	7.179	15.766	130	JUNCTION	153.82	153.82	0	00:45	4.095	4.095
806	JUNCTION	159.69	159.69	0	01:00	6.656	6.656	977	JUNCTION	0.00	91.19	0	01:26	0.000	4.125
807	JUNCTION	139.53	297.68	0	01:05	6.072	12.728	120	JUNCTION	229.49	229.49	0	00:40	4.346	4.346
808	JUNCTION	370.71	370.71	0	01:05	15.181	15.181	981	JUNCTION	0.00	146.95	0	01:00	0.000	4.348
809	JUNCTION	536.72	536.72	0	01:10	24.623	24.623	225	JUNCTION	263.75	263.75	0	00:55	9.249	9.249
810	JUNCTION	605.20	605.20	0	01:20	32.476	32.476	982	JUNCTION	0.00	169.02	0	01:38	0.000	9.306
811	JUNCTION	195.20	606.07	0	01:13	5.452	30.220	983	JUNCTION	0.00	274.44	0	01:24	0.000	15.018
812	JUNCTION	134.19	474.63	0	01:10	5.900	24.678	984	JUNCTION	0.00	274.72	0	01:22	0.000	15.017
813	JUNCTION	348.77	348.77	0	01:15	18.777	18.777	985	JUNCTION	0.00	485.81	0	01:27	0.000	23.699
814	JUNCTION	225.13	225.13	0	00:45	5.824	5.824	986	JUNCTION	0.00	222.13	0	01:19	0.000	8.667
815	JUNCTION	480.26	480.26	0	01:15	24.537	24.537	987	JUNCTION	0.00	279.19	0	01:11	0.000	13.058
818	JUNCTION	420.78	890.26	0	01:20	22.709	47.353	988	JUNCTION	0.00	92.61	0	01:22	0.000	4.667
821	JUNCTION	219.18	219.18	0	00:50	6.774	6.774	989	JUNCTION	0.00	92.61	0	01:22	0.000	4.669
824	JUNCTION	198.21	198.21	0	01:05	8.499	8.499	110	JUNCTION	271.49	271.49	0	00:40	4.956	4.956
825	JUNCTION	161.21	161.21	0	00:50	5.415	5.415	990	JUNCTION	0.00	108.60	0	01:15	0.000	4.959
834	JUNCTION	122.51	122.51	0	00:45	3.005	3.005	991	JUNCTION	0.00	52.02	0	01:10	0.000	3.287
835	JUNCTION	417.22	417.22	0	00:35	5.327	5.327	BT001	OUTFALL	0.00	1112.39	0	01:11	0.000	53.011
836	JUNCTION	212.05	212.05	0	00:35	3.288	3.288	BT005	OUTFALL	0.00	100.96	0	00:40	0.000	2.144
837	JUNCTION	85.58	85.58	0	00:30	1.147	1.147	BT010	OUTFALL	0.00	798.66	0	00:51	0.000	24.235
838	JUNCTION	171.71	171.71	0	00:30	1.899	1.899	BT015	OUTFALL	0.00	207.65	0	00:50	0.000	6.639
900	JUNCTION	0.00	391.59	0	00:57	0.000	22.975	BT020	OUTFALL	0.00	161.21	0	00:50	0.000	5.415
902	JUNCTION	0.00	391.29	0	00:59	0.000	22.993	BT025	OUTFALL	0.00	198.21	0	01:05	0.000	8.499
903	JUNCTION	0.00	720.18	0	00:49	0.000	31.150	BT030	OUTFALL	0.00	219.18	0	00:50	0.000	6.774

Table C.1 – Baseline Hydrology SWMM Input/Output

BT035	OUTFALL	0.00	1628.65	0	03:06	0.000	121.112
BT040	OUTFALL	0.00	890.26	0	01:20	0.000	47.353
BT045	OUTFALL	0.00	225.13	0	00:45	0.000	5.824
BT046	OUTFALL	0.00	171.71	0	00:30	0.000	1.899
BT047	OUTFALL	0.00	85.58	0	00:30	0.000	1.147
BT055	OUTFALL	0.00	417.26	0	00:35	0.000	9.086
BT060	OUTFALL	0.00	606.07	0	01:13	0.000	30.220
BT065	OUTFALL	0.00	605.20	0	01:20	0.000	32.476
BT070	OUTFALL	0.00	536.72	0	01:10	0.000	24.623
BT075	OUTFALL	0.00	370.71	0	01:05	0.000	15.181
BT080	OUTFALL	0.00	430.32	0	00:35	0.000	18.640
BT085	OUTFALL	0.00	340.30	0	01:05	0.000	15.771
LT001	OUTFALL	0.00	59.15	0	01:00	0.000	2.586
LT005	OUTFALL	0.00	92.61	0	01:22	0.000	4.667
LT010	OUTFALL	0.00	42.53	0	00:40	0.000	0.894
LT015	OUTFALL	0.00	230.23	0	01:13	0.000	15.402
LT020	OUTFALL	0.00	717.39	0	00:50	0.000	31.150
SPR001	OUTFALL	0.00	0.00	0	00:00	0.000	0.000
SPR005	OUTFALL	0.00	6.00	0	04:09	0.000	2.622
SPR010	OUTFALL	0.00	52.02	0	01:10	0.000	3.287
IRR_RETURN	OUTFALL	0.00	5.23	0	01:26	0.000	0.227
001	DIVIDER	116.25	720.66	0	00:49	1.547	31.138
010	DIVIDER	23.58	31.41	0	00:36	0.328	0.586
951	DIVIDER	0.00	29.32	0	00:35	0.000	0.414
952	DIVIDER	0.00	48.71	0	00:40	0.000	1.041
953	DIVIDER	0.00	15.51	0	00:35	0.000	0.372
210	DIVIDER	42.99	42.99	0	00:40	0.894	0.894
310	DIVIDER	210.03	1618.74	0	03:02	3.230	118.081
901	DIVIDER	0.00	391.49	0	00:58	0.000	22.974
916	DIVIDER	0.00	459.86	0	00:58	0.000	25.068
919	DIVIDER	0.00	230.23	0	01:13	0.000	15.403
923	DIVIDER	0.00	78.55	0	01:21	0.000	4.613
932	DIVIDER	0.00	391.40	0	00:59	0.000	22.989
934	DIVIDER	0.00	1618.67	0	03:04	0.000	118.045
936	DIVIDER	0.00	1618.70	0	03:03	0.000	118.058
938	DIVIDER	0.00	1618.77	0	03:02	0.000	114.862
940	DIVIDER	0.00	84.47	0	01:43	0.000	4.649
941	DIVIDER	0.00	210.27	0	01:31	0.000	13.249
942	DIVIDER	0.00	105.91	0	00:51	0.000	6.782
943	DIVIDER	0.00	106.28	0	00:50	0.000	6.772
948	DIVIDER	0.00	739.35	0	01:39	0.000	41.469
CL_Outlet	DIVIDER	0.00	6.00	0	00:39	0.000	3.788
950	DIVIDER	0.00	391.66	0	00:57	0.000	22.949
957	DIVIDER	0.00	750.32	0	01:30	0.000	41.426
959	DIVIDER	0.00	1619.26	0	02:58	0.000	114.909
944	DIVIDER	0.00	230.31	0	01:10	0.000	15.401
976	DIVIDER	0.00	2011.10	0	01:39	0.000	107.600
978	DIVIDER	0.00	158.86	0	01:00	0.000	6.998
225_SPLIT	DIVIDER	0.00	168.99	0	01:40	0.000	9.292
LOLA_DIVERSION	DIVIDER	0.00	1462.02	0	02:26	0.000	89.834
115_Pond	STORAGE	0.00	129.57	0	00:41	0.000	2.179
116_POND	STORAGE	0.00	269.03	0	00:41	0.000	6.710
117_POND	STORAGE	0.00	290.09	0	00:39	0.000	4.310
120_POND	STORAGE	0.00	229.41	0	00:40	0.000	4.349
130_POND	STORAGE	0.00	147.01	0	00:53	0.000	4.125
137_Pond	STORAGE	0.00	676.02	0	00:47	0.000	15.723
225_POND	STORAGE	0.00	257.31	0	01:01	0.000	9.307
335_POND	STORAGE	0.00	775.43	0	00:40	0.000	13.060
355_POND	STORAGE	0.00	711.68	0	00:45	0.000	15.018
360_POND	STORAGE	0.00	359.17	0	00:51	0.000	8.669
Centennial	STORAGE	0.00	808.44	0	00:40	0.000	13.817
CF	STORAGE	0.00	197.64	0	00:41	0.000	3.918
Ehrlich	STORAGE	0.00	1881.13	0	02:33	0.000	134.170
PH	STORAGE	0.00	2260.66	0	01:39	0.000	122.998
PlatteRiverVillagePond	STORAGE	0.00	625.22	0	00:50	0.000	14.739
SV_S	STORAGE	0.00	336.37	0	00:35	0.000	4.514
505_POND	STORAGE	0.00	198.07	0	00:46	0.000	4.669
110_POND	STORAGE	0.00	267.09	0	00:41	0.000	4.960
325_POND	STORAGE	0.00	440.45	0	00:40	0.000	8.685
836_POND	STORAGE	0.00	212.05	0	00:35	0.000	3.288

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
020	JUNCTION	24.00	0.000	0.000
025	JUNCTION	24.00	0.000	0.000
030	JUNCTION	24.00	0.000	0.000
040	JUNCTION	24.00	0.000	0.000
045	JUNCTION	24.00	0.000	0.000
125	JUNCTION	24.00	0.000	0.000
200	JUNCTION	24.00	0.000	0.000
215	JUNCTION	24.00	0.000	0.000
220	JUNCTION	24.00	0.000	0.000
330	JUNCTION	24.00	0.000	0.000
335	JUNCTION	24.00	0.000	0.000
340	JUNCTION	24.00	0.000	0.000
345	JUNCTION	24.00	0.000	0.000
405	JUNCTION	24.00	0.000	0.000
415	JUNCTION	24.00	0.000	0.000
500	JUNCTION	24.00	0.000	0.000
510	JUNCTION	24.00	0.000	0.000
600	JUNCTION	24.00	0.000	0.000
625	JUNCTION	24.00	0.000	0.000
650	JUNCTION	24.00	0.000	0.000
675	JUNCTION	24.00	0.000	0.000
803	JUNCTION	24.00	0.000	0.000
806	JUNCTION	24.00	0.000	0.000
808	JUNCTION	24.00	0.000	0.000
809	JUNCTION	24.00	0.000	0.000
810	JUNCTION	24.00	0.000	0.000
813	JUNCTION	24.00	0.000	0.000
814	JUNCTION	24.00	0.000	0.000

Table C.1 – Baseline Hydrology SWMM Input/Output

821	JUNCTION	24.00	0.000	0.000
824	JUNCTION	24.00	0.000	0.000
825	JUNCTION	24.00	0.000	0.000
834	JUNCTION	24.00	0.000	0.000
835	JUNCTION	24.00	0.000	0.000
836	JUNCTION	24.00	0.000	0.000
837	JUNCTION	24.00	0.000	0.000
838	JUNCTION	24.00	0.000	0.000
960	JUNCTION	13.37	0.000	3.230
991	JUNCTION	24.00	0.000	0.000
210	DIVIDER	0.49	0.000	0.000
335_POND	STORAGE	24.00	6.653	3.347
355_POND	STORAGE	0.63	0.223	2.777
Centennial	STORAGE	24.00	4.743	7.257
CF	STORAGE	4.12	0.508	0.012
Ehrlich	STORAGE	22.54	7.113	0.887
SV_S	STORAGE	24.00	1.615	5.385
836_POND	STORAGE	24.00	3.489	6.511

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Node Flooding Summary
****

No nodes were flooded.

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Storage Volume Summary
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Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days	hr:min	Maximum Outflow CFS
115_Pond	11.693	5	0	149.506	61	0	01:08	56.54
116_POND	22.396	5	0	289.022	59	0	01:14	126.32
117_POND	14.245	3	0	265.538	54	0	00:59	136.72
120_POND	6.934	1	0	170.691	16	0	01:00	146.95
130_POND	20.608	4	0	226.218	42	0	01:26	91.19
137_Pond	42.490	2	0	723.287	33	0	01:17	390.42
225_POND	25.153	5	0	346.035	64	0	01:38	169.02
335_POND	66.790	3	0	963.900	44	0	01:11	279.19
355_POND	127.009	5	0	1188.326	43	0	01:22	274.72
360_POND	38.515	7	0	463.974	85	0	01:19	222.13
Centennial	1530.455	30	0	1801.560	35	0	02:27	6.00
CF	202.869	48	0	423.865	100	0	01:21	63.58
Ehrlich	3976.887	48	0	6769.797	82	0	02:58	1619.26
PH	5174.042	64	0	7741.263	96	0	02:21	1427.50
PlatteRiverVillagePond	72.068	3	0	887.602	41	0	01:20	357.18
SV_S	385.980	15	0	570.680	22	0	02:08	6.00
505_POND	25.923	5	0	306.549	56	0	01:22	92.61
110_POND	27.405	5	0	356.014	65	0	01:15	108.60
325_POND	45.221	6	0	620.801	76	0	01:17	169.89
836_POND	25.051	1	0	265.193	12	0	01:10	52.02

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
BT001	44.42	184.63	1112.39	53.011
BT005	13.11	25.29	100.96	2.144
BT010	39.25	95.55	798.66	24.235
BT015	18.01	57.04	207.65	6.639
BT020	19.09	43.89	161.21	5.415
BT025	23.55	55.85	198.21	8.499
BT030	18.14	57.79	219.18	6.774
BT035	99.20	188.91	1628.65	121.112
BT040	83.97	87.25	890.26	47.353
BT045	15.54	57.99	225.13	5.824
BT046	9.02	32.57	171.71	1.899
BT047	9.37	18.95	85.58	1.147
BT055	99.65	14.11	417.26	9.086
BT060	73.55	63.57	606.07	30.220
BT065	29.50	170.33	605.20	32.476
BT070	25.69	148.31	536.72	24.623
BT075	23.00	102.14	370.71	15.181
BT080	72.45	39.81	430.32	18.640
BT085	39.59	61.63	340.30	15.771
LT001	23.26	17.20	59.15	2.586
LT005	26.50	27.25	92.61	4.667
LT010	13.13	10.53	42.53	0.894
LT015	70.15	33.97	230.23	15.402
LT020	99.12	48.62	717.39	31.150
SPR001	0.00	0.00	0.00	0.000
SPR005	99.10	4.09	6.00	2.622
SPR010	23.70	21.46	52.02	3.287
IRR_RETURN	21.94	1.60	5.23	0.227
System	40.46	1670.34	7687.67	490.882

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Link Flow Summary
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Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days	hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
CE001	CONDUIT	267.18	0	00:33	9.09	1.08	1.00
CE001_OF	CONDUIT	472.15	0	00:49	2.00	0.02	0.10

Table C.1 – Baseline Hydrology SWMM Input/Output

CE405	DUMMY	695.99	0	00:35			
CE415	DUMMY	336.37	0	00:35			
CE500	DUMMY	42.53	0	00:40			
CE505	DUMMY	92.61	0	01:22			
CE510	DUMMY	59.15	0	01:00			
CE600	DUMMY	207.65	0	00:50			
CE625	DUMMY	798.66	0	00:51			
CE630	DUMMY	644.11	0	00:51			
CE635	CONDUIT	394.48	0	00:56	6.36	0.08	0.28
CE640	CONDUIT	51.65	0	00:49	3.82	0.01	0.08
CE650	DUMMY	100.96	0	00:40			
CE655	DUMMY	1112.39	0	01:11			
CE660	CONDUIT	283.54	0	00:51	7.04	0.14	0.40
CE665	CONDUIT	162.59	0	00:55	12.32	0.01	0.08
CE675	DUMMY	857.42	0	01:15			
CE803	DUMMY	157.56	0	01:10			
CE804	DUMMY	430.32	0	00:35			
CE805	CONDUIT	340.30	0	01:05	9.41	0.23	0.55
CE806	DUMMY	159.69	0	01:00			
CE807	CONDUIT	295.06	0	01:10	4.70	0.26	0.54
CE808	DUMMY	370.71	0	01:05			
CE809	DUMMY	536.72	0	01:10			
CE810	DUMMY	605.20	0	01:20			
CE811	DUMMY	606.07	0	01:13			
CE813	DUMMY	348.77	0	01:15			
CE814	DUMMY	225.13	0	00:45			
CE815	CONDUIT	475.75	0	01:22	6.53	0.32	0.60
CE818	DUMMY	890.26	0	01:20			
CE821	DUMMY	219.18	0	00:50			
CE824	DUMMY	198.21	0	01:05			
CE825	DUMMY	161.21	0	00:50			
CE834	DUMMY	122.51	0	00:45			
CE835	DUMMY	417.22	0	00:35			
CE837	DUMMY	85.58	0	00:30			
CE838	DUMMY	171.71	0	00:30			
CE910	CONDUIT	1071.74	0	01:12	6.62	0.90	0.96
CE911	CONDUIT	471.97	0	01:21	6.23	0.28	0.57
CE915	CONDUIT	6.00	0	02:44	1.85	0.01	0.09
CL_Out	CONDUIT	6.00	0	01:13	5.11	0.72	0.63
CL_Spill	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
D020	DUMMY	104.71	0	00:40			
D025	DUMMY	29.32	0	00:35			
D030	DUMMY	42.26	0	00:40			
D040	DUMMY	13.83	0	00:35			
D200	DUMMY	41.77	0	00:45			
D215	DUMMY	59.15	0	00:50			
D220	DUMMY	100.07	0	00:40			
D330	DUMMY	389.31	0	00:35			
L335	DUMMY	775.43	0	00:40			
D340	DUMMY	20.75	0	00:50			
D345	DUMMY	109.56	0	00:40			
LOLA_SPILL	CONDUIT	1389.88	0	02:37	5.29	0.48	0.75
E300	DUMMY	1628.65	0	03:06			
E305	CONDUIT	69.28	0	00:36	4.35	0.01	0.16
E310	CONDUIT	47.62	0	01:51	4.13	1.08	1.00
E310_OF	CONDUIT	1574.72	0	03:02	6.86	0.34	0.65
E320	CONDUIT	75.94	0	00:40	6.51	0.00	0.06
E350	CONDUIT	92.98	0	00:43	4.06	0.01	0.17
E355	CONDUIT	272.54	0	01:30	3.75	0.06	0.30
E360	CONDUIT	484.27	0	01:31	6.18	0.07	0.31
E904	CONDUIT	1618.77	0	03:02	13.71	0.11	0.40
E906	CONDUIT	1567.28	0	03:01	16.88	0.43	0.68
E922	CONDUIT	540.89	0	01:36	4.88	0.11	0.38
E923	CONDUIT	48.71	0	01:35	4.81	1.12	1.00
E923_OF	CONDUIT	24.07	0	01:25	3.09	0.13	0.38
E927	CONDUIT	739.35	0	01:39	2.52	0.58	0.80
E933	CONDUIT	1618.70	0	03:03	7.13	0.27	0.58
E934	CONDUIT	126.15	0	07:58	6.98	1.08	1.00
E934_OF	CONDUIT	1501.96	0	03:04	5.63	0.42	0.71
E935	CONDUIT	1618.15	0	03:06	9.78	0.18	0.48
E936	CONDUIT	197.26	0	06:15	13.39	1.07	1.00
E936_OF	CONDUIT	1434.77	0	03:03	6.03	0.36	0.66
E937	CONDUIT	1618.67	0	03:04	8.26	0.29	0.59
E938	CONDUIT	201.54	0	06:10	17.10	1.08	1.00
E938_OF	CONDUIT	1431.76	0	03:02	7.71	0.26	0.58
E939	CONDUIT	1618.74	0	03:02	7.96	0.24	0.55
E948	CONDUIT	124.12	0	00:53	10.75	1.08	1.00
E948_OF	CONDUIT	624.58	0	01:40	4.41	0.16	0.48
E956	CONDUIT	1471.01	0	02:37	8.37	0.03	0.25
E957	CONDUIT	143.50	0	00:43	6.90	1.12	1.00
E957_OF	CONDUIT	621.94	0	01:31	4.27	0.58	0.80
E958	CONDUIT	55.06	0	02:00	7.37	0.64	0.58
E959	CONDUIT	55.71	0	01:59	4.81	1.08	1.00
E959_OF	CONDUIT	1567.33	0	03:01	2.29	0.72	0.88
E960	CONDUIT	56.89	0	01:59	6.71	0.77	0.65
Eh_In	DUMMY	739.33	0	01:40			
L010	CONDUIT	12.69	0	01:09	7.79	1.08	1.00
L010_OF	CONDUIT	19.68	0	00:36	3.00	0.04	0.21
L015	CONDUIT	23.10	0	00:44	2.42	0.00	0.12
L019	CONDUIT	185.25	0	00:42	3.19	0.05	0.32
L045_OF	DUMMY	36.28	0	00:45			
L100	CONDUIT	230.20	0	00:52	4.57	0.36	0.66
L105	CONDUIT	137.98	0	00:58	5.90	0.13	0.44
LOLA	CONDUIT	54.79	0	00:57	3.45	1.00	1.00
L917	DUMMY	2260.66	0	01:39			
980	CONDUIT	124.24	0	01:25	13.93	1.07	1.00
980_OF	CONDUIT	43.24	0	01:01	3.82	0.08	0.32
L125	DUMMY	360.40	0	01:15			
L976	CONDUIT	12.88	0	00:27	4.42	1.08	1.00
L130_OF	CONDUIT	1998.13	0	01:42	4.52	0.75	0.89
L135	CONDUIT	625.22	0	00:50	4.82	0.06	0.22
L140	CONDUIT	460.16	0	01:16	4.43	0.12	0.43
L145	CONDUIT	312.65	0	01:24	3.76	0.08	0.27
L205	CONDUIT	15.31	0	00:35	4.42	0.01	0.12
L206	CONDUIT	10.75	0	00:43	1.46	0.02	0.19
L900	CHANNEL	391.49	0	00:58	5.95	0.23	0.50
L901	CONDUIT	351.55	0	00:46	11.30	1.12	1.00
L901_OF	CONDUIT	76.97	0	00:58	3.44	0.01	0.08
L902	CONDUIT	391.25	0	01:00	7.19	0.04	0.24
L903	CONDUIT	717.39	0	00:50	5.96	0.50	0.71

Table C.1 – Baseline Hydrology SWMM Input/Output

L905	CONDUIT	459.60	0	01:01	6.39	0.07	0.36
L916	CONDUIT	440.29	0	00:46	14.70	1.12	1.00
L916_OF	CONDUIT	65.95	0	00:58	3.94	0.15	0.42
L918	CONDUIT	1423.76	0	02:26	4.76	0.48	0.75
L920	CONDUIT	1044.24	0	01:40	4.64	0.39	0.67
L926	CONDUIT	42.53	0	00:46	2.22	0.01	0.18
L928	CONDUIT	158.57	0	01:04	2.57	0.09	0.37
L929	CONDUIT	12.13	0	07:12	1.35	0.04	0.26
L930	CONDUIT	31.38	0	00:37	1.91	0.23	0.53
L931	CONDUIT	391.40	0	00:59	1.33	0.09	0.38
L932	CONDUIT	128.90	0	00:36	4.30	1.00	1.00
L932_OF	CONDUIT	262.40	0	00:59	2.50	0.33	0.63
L950	CONDUIT	324.82	0	00:45	11.09	1.08	1.00
L950_OF	CONDUIT	91.37	0	00:57	6.34	0.01	0.10
L951	CONDUIT	6.99	0	00:25	2.58	1.08	1.00
L951_OF	CONDUIT	21.33	0	00:38	4.60	0.00	0.09
L952	CONDUIT	1.82	0	02:18	0.74	1.08	1.00
L952_OF	CONDUIT	46.06	0	00:43	3.71	0.01	0.14
L953	CONDUIT	5.23	0	01:26	1.92	1.08	1.00
L953_OF	CONDUIT	9.84	0	00:45	4.31	0.00	0.07
Q210	CONDUIT	30.96	0	00:58	10.70	1.07	1.00
Q210_OF	CONDUIT	14.04	0	00:40	3.29	0.03	0.21
Q225	CONDUIT	84.47	0	01:43	5.86	0.05	0.29
Q225_OF	CONDUIT	84.26	0	01:48	4.78	0.07	0.33
Q919	CONDUIT	230.23	0	01:13	13.93	0.71	0.63
Q919_OF	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
Q940	CONDUIT	21.53	0	03:47	5.01	1.08	1.00
Q940_OF	CONDUIT	64.47	0	01:48	2.47	0.13	0.39
Q941	CONDUIT	144.72	0	02:37	8.17	1.08	1.00
Q941_OF	CONDUIT	74.87	0	01:42	5.75	0.21	0.53
Q942	CONDUIT	105.49	0	00:52	10.53	0.90	0.75
Q942_OF	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
Q943	CONDUIT	49.96	0	03:05	7.70	1.08	1.00
Q943_OF	CONDUIT	59.71	0	00:51	2.53	0.08	0.30
Q944	CONDUIT	230.29	0	01:11	16.50	0.78	0.63
Q945	CONDUIT	230.24	0	01:13	3.18	0.38	0.64
Q946	CONDUIT	230.23	0	01:13	3.28	0.62	0.58
Q947	CONDUIT	230.23	0	01:13	10.04	0.08	0.29
SPR836	DUMMY	52.02	0	01:10			
SPR925	CONDUIT	6.00	0	04:09	6.24	0.08	0.19
944_OF	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
L137	CONDUIT	676.02	0	00:47	3.85	0.09	0.28
L136	CONDUIT	1631.95	0	01:42	6.62	0.14	0.37
L115	CONDUIT	129.57	0	00:41	3.05	0.01	0.16
L116	CONDUIT	269.03	0	00:41	5.75	0.03	0.17
L117	CONDUIT	290.09	0	00:39	6.25	0.04	0.24
L988	CONDUIT	31.27	0	00:40	9.80	0.17	0.43
48	CONDUIT	57.94	0	00:59	3.48	0.19	0.42
49	CONDUIT	346.03	0	01:29	3.60	0.04	0.17
921	CONDUIT	390.42	0	01:17	20.19	0.06	0.26
971	CONDUIT	52.97	0	01:23	3.09	0.05	0.23
973	CONDUIT	126.31	0	01:15	2.13	0.29	0.56
975	CONDUIT	136.66	0	01:00	4.86	0.10	0.34
L130	CONDUIT	147.01	0	00:53	2.79	0.32	0.62
978	CONDUIT	91.19	0	01:26	12.57	0.60	0.56
L120	CONDUIT	229.41	0	00:40	3.42	0.44	0.71
982	CONDUIT	146.95	0	01:00	10.31	0.05	0.27
L225	CONDUIT	257.31	0	01:01	5.18	0.30	0.60
L982	CONDUIT	168.99	0	01:40	7.39	0.80	0.68
L355	CONDUIT	711.68	0	00:45	23.55	0.15	0.44
L984	CONDUIT	274.44	0	01:24	2.89	0.69	0.86
L360	CONDUIT	359.17	0	00:51	5.33	0.36	0.62
L986	CONDUIT	222.11	0	01:20	5.18	0.24	0.54
L987	CONDUIT	279.18	0	01:11	15.04	0.08	0.32
L505	CONDUIT	198.07	0	00:46	4.93	0.22	0.52
51	CONDUIT	92.61	0	01:22	8.73	0.96	0.79
L110	CONDUIT	267.09	0	00:41	5.76	0.27	0.57
L990	CONDUIT	108.59	0	01:15	5.34	0.09	0.34
L325	CONDUIT	440.45	0	00:40	22.80	0.08	0.33
52	DUMMY	212.05	0	00:35			
PH_Weir	WEIR	1427.50	0	02:21			0.00
Centennial_Out	DUMMY	6.00	0	00:39			
CF_OUT	DUMMY	63.58	0	01:21			
EL_OUT	DUMMY	1619.26	0	02:58			
SV_S_Outlet	DUMMY	6.00	0	01:11			
PRV_OUT	DUMMY	357.18	0	01:20			
137_Out	DUMMY	390.42	0	01:17			
115_Out	DUMMY	56.54	0	01:08			
116_OUT	DUMMY	126.32	0	01:14			
117_OUT	DUMMY	136.72	0	00:59			
130_OUT	DUMMY	91.19	0	01:26			
120_OUT	DUMMY	146.95	0	01:00			
225_OUT	DUMMY	169.02	0	01:38			
355_OUT	DUMMY	274.72	0	01:22			
360_OUT	DUMMY	222.13	0	01:19			
335_OUT	DUMMY	279.19	0	01:11			
505_OUT	DUMMY	92.61	0	01:22			
110_OUT	DUMMY	108.60	0	01:15			
325_OUT	DUMMY	169.89	0	01:18			
836_OUT	DUMMY	52.02	0	01:10			

****
Conduit Surcharge Summary
****

Conduit	Hours Full Both Ends	Hours Full Upstream	Hours Full Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
CE001	1.14	1.18	1.14	1.82	1.18
CE405	0.01	0.01	0.01	24.00	0.01
CE415	0.01	0.01	0.01	24.00	0.01
CE500	0.01	0.01	0.01	24.00	0.01
CE505	0.01	0.01	0.01	24.00	0.01
CE510	0.01	0.01	0.01	24.00	0.01
CE600	0.01	0.01	0.01	24.00	0.01
CE625	0.01	0.01	0.01	24.00	0.01
CE630	0.01	0.01	0.01	24.00	0.01

Table C.1 – Baseline Hydrology SWMM Input/Output

CE650	0.01	0.01	0.01	24.00	0.01
CE655	0.01	0.01	0.01	24.00	0.01
CE675	0.01	0.01	0.01	24.00	0.01
CE803	0.01	0.01	0.01	24.00	0.01
CE804	0.01	0.01	0.01	24.00	0.01
CE806	0.01	0.01	0.01	24.00	0.01
CE808	0.01	0.01	0.01	24.00	0.01
CE809	0.01	0.01	0.01	24.00	0.01
CE810	0.01	0.01	0.01	24.00	0.01
CE811	0.01	0.01	0.01	24.00	0.01
CE813	0.01	0.01	0.01	24.00	0.01
CE814	0.01	0.01	0.01	24.00	0.01
CE818	0.01	0.01	0.01	24.00	0.01
CE821	0.01	0.01	0.01	24.00	0.01
CE824	0.01	0.01	0.01	24.00	0.01
CE825	0.01	0.01	0.01	24.00	0.01
CE834	0.01	0.01	0.01	24.00	0.01
CE835	0.01	0.01	0.01	24.00	0.01
CE837	0.01	0.01	0.01	24.00	0.01
CE838	0.01	0.01	0.01	24.00	0.01
D020	0.01	0.01	0.01	24.00	0.01
D025	0.01	0.01	0.01	24.00	0.01
D030	0.01	0.01	0.01	24.00	0.01
D040	0.01	0.01	0.01	24.00	0.01
D200	0.01	0.01	0.01	24.00	0.01
D215	0.01	0.01	0.01	24.00	0.01
D220	0.01	0.01	0.01	24.00	0.01
D330	0.01	0.01	0.01	24.00	0.01
L335	0.01	0.01	0.01	24.00	0.01
D340	0.01	0.01	0.01	24.00	0.01
D345	0.01	0.01	0.01	24.00	0.01
E300	0.01	0.01	0.01	24.00	0.01
E310	16.03	16.11	16.03	0.09	16.11
E923	0.20	0.23	0.21	0.25	0.23
E934	5.77	5.80	5.77	5.81	5.80
E936	3.80	3.91	3.80	3.91	3.91
E938	3.64	3.74	3.64	3.74	3.74
E948	3.37	3.43	3.38	0.06	3.43
E957	3.20	3.27	3.20	4.20	3.27
E959	13.36	13.44	13.37	13.46	13.44
Eh_In	0.01	0.01	0.01	24.00	0.01
L010	0.71	0.72	0.71	0.72	0.72
L045_OF	0.01	0.01	0.01	24.00	0.01
LOLA	6.48	6.61	6.54	6.54	6.61
L917	0.01	0.01	0.01	24.00	0.01
980	0.65	0.73	0.65	0.73	0.73
L125	0.01	0.01	0.01	24.00	0.01
L976	6.72	6.74	6.72	0.03	6.74
L901	0.51	0.56	0.52	1.27	0.56
L916	0.42	0.46	0.42	1.16	0.46
L932	1.46	1.47	1.47	1.47	1.47
L950	0.53	0.60	0.53	1.31	0.60
L951	0.70	0.77	0.72	0.78	0.77
L952	1.89	1.97	1.94	0.08	1.97
L953	0.91	0.99	0.94	0.08	0.99
Q210	0.44	0.49	0.44	0.06	0.49
Q919	0.01	0.01	0.01	1.98	0.01
Q940	2.91	2.97	2.92	0.06	2.97
Q941	1.73	1.91	1.76	1.95	1.91
Q943	2.55	2.58	2.55	0.06	2.58
Q946	0.01	0.01	0.01	1.66	0.01
SPR836	0.01	0.01	0.01	24.00	0.01
L982	0.01	0.01	0.01	1.52	0.01
52	0.01	0.01	0.01	24.00	0.01

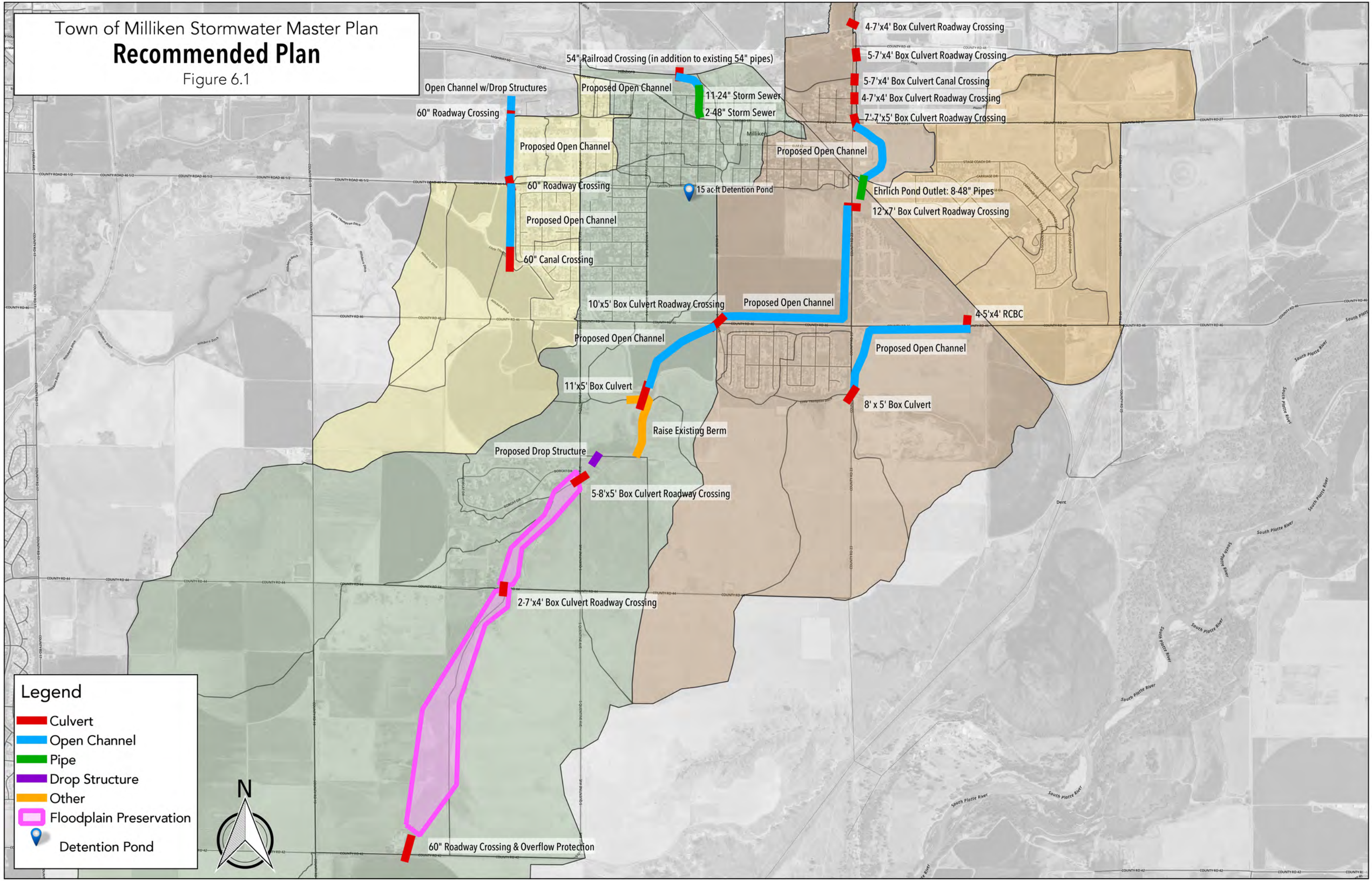
```
Analysis begun on:  Tue Sep 09 16:01:56 2014
Analysis ended on:  Tue Sep 09 16:01:58 2014
Total elapsed time: 00:00:02
```

APPENDIX D - RECOMMENDED PLAN

Town of Milliken Stormwater Master Plan

Recommended Plan

Figure 6.1



MASTER PLAN COST ESTIMATE FOR INDIVIDUAL REACH

PROJECT :	Milliken Master Plan - Recommended Plan
DRAINAGEWAY :	Western Tributary
REACH :	Western Tributary
JURISDICTION :	Milliken
REACH ID:	West-ReachWestern Tributary TGM — DATE : 9/1/2014

DESCRIPTION			QUANTITY	UNIT	UNIT COST	TOTAL COST	USER COMMENTS
Pipe Culverts and Storm Drains							
Circular Pipes							
Diameter (in)	Length (ft)	No. of Barrels					
60-inch	150	1	150	L.F.	$286.00	$42,900.00	Crossing of Little Thompson Ditch
60-inch	100	1	100	L.F.	$286.00	$28,600.00	Crossing of Green St
60-inch	100	1	100	L.F.	$286.00	$28,600.00	Crossing of Broad St
Headwalls							
Diameter (in)	Applicable	No. of Barrels					
60-inch	Yes	1	2	EA	$1,930.42	$3,861.00	
60-inch	Yes	1	2	EA	$1,930.42	$3,861.00	
60-inch	Yes	1	2	EA	$1,930.42	$3,861.00	
Wingwalls (includes concrete apron)							
Diameter (in)		No. of Barrels					
60-inch		1	2	EA	$10,706.05	$21,412.00	
60-inch		1	2	EA	$10,706.05	$21,412.00	
60-inch		1	2	EA	$10,706.05	$21,412.00	
Hydraulic Structures							
Sloping Drop Structures							
Height (ft)	Bottom Width (ft)	Yn (ft)					
5	10	5	4	EA	$85,622.99	$342,492.00	
Channel Improvements							
12-inch Riprap, Type M			200	C.Y.	$71.00	$14,200.00	culvert protection
Excavation, Low Range			27000	C.Y.	$13.00	$351,000.00	Western Outfall Channel
Soil Riprap, Type M			100	C.Y.	$83.00	$8,300.00	overflow protection @ Beeline Ditch crossing
Landscaping and Maintenance Improvements							
Reclamation & seeding (native grasses)			9	ACRE	$1,190.00	$10,710.00	
Special Items (User Defined)							
Beeline Ditch Crossing	<----User Defined Items		500	C.Y.	$13.00	$6,500.00	overflow weir of Beeline Ditch @ outfall channel
Land Acquisition							
Easement/ROW Acquisition			8.78	ACRE	$1,193.50	$10,479.00	Purvis & Binder easements

Master Plan Capital Improvement Cost Summary

Capital Improvement Costs			
Pipe Culverts and Storm Drains			$175,919.00
Concrete Box Culverts			$0.00
Hydraulic Structures			$342,492.00
Channel Improvements			$373,500.00
Detention/Water Quality Facilities			$0.00
Removals			$0.00
Landscaping and Maintenance Improvements			$10,710.00
Special Items (User Defined)			$6,500.00
Subtotal Capital Improvement Costs			**$909,121.00**
Additional Capital Improvement Costs			
Dewatering	$15,950.00	L.S.	$15,950.00
Mobilization	5%		$45,456.00
Traffic Control	$10,000.00	L.S.	$10,000.00
Utility Coordination/Relocation	$20,000.00	L.S.	$20,000.00
Stormwater Management/Erosion Control	5%		$45,456.00
Subtotal Additional Capital Improvement Costs			**$136,862.00**
Land Acquisition Costs			
ROW/Easements			$10,479.00
Subtotal Land Acquisition Costs			**$10,479.00**
Other Costs (percentage of Capital Improvement Costs)			
Engineering	15%		$156,897.00
Legal/Administrative	5%		$52,299.00
Contract Admin/Construction Management	10%		$104,598.00
Contingency	25%		$261,496.00
Subtotal Other Costs			**$575,290.00**
Total Capital Improvement Costs			**$1,631,752.00**

Master Plan Operation and Maintenance Cost Summary

Description	Quantity	Unit	Unit Cost	Total Annual Cost
Culvert Maintenance (e.g. sediment & debris removal, erosion at entrance/exit, structural repairs, e	300	L.F.	$1.00	$150.00
Hydraulic Structure Maintenance (e.g. debris removal, erosion, structural repairs, etc.)	4	EA	$600.00	$1,200.00
Channel Maintenance (e.g. sediment & debris removal, erosion, tree & weed removal, etc.)	3400	L.F.	$2.00	$3,400.00
Total Annual Operation and Maintenance Cost				**$4,750.00**
Effective Interest Rate				0.00%
Total Operation and Maintenance Costs Over 50 Years				**$237,500.00**

MASTER PLAN COST ESTIMATE FOR INDIVIDUAL REACH

PROJECT :	Milliken Master Plan - Recommended Plan
DRAINAGEWAY :	Lola Park Tributary
REACH :	Lola
JURISDICTION :	Milliken
REACH ID:	Lola-ReachLola TGM — DATE : 9/1/2014

DESCRIPTION			QUANTITY	UNIT	UNIT COST	TOTAL COST	USER COMMENTS
Pipe Culverts and Storm Drains							
Circular Pipes							
Diameter (in)	Length (ft)	No. of Barrels					
60-inch	400	1	400	L.F.	$286.00	$114,400.00	CR42
48-inch	450	2	900	L.F.	$171.00	$153,900.00	Josephine Outfall
24-inch	100	11	1100	L.F.	$86.00	$94,600.00	Platte/Thompson Crossing
Flare End Sections							
Diameter (in)	Applicable	No. of Barrels					
24-inch	Yes	11	11	EA	$1,154.00	$12,694.00	
Headwalls							
Diameter (in)	Applicable	No. of Barrels					
60-inch	Yes	1	2	EA	$1,930.42	$3,861.00	
Wingwalls (includes concrete apron)							
Diameter (in)		No. of Barrels					
60-inch		1	2	EA	$10,706.05	$21,412.00	
Manholes and Inlets							
Manhole, 6' Dia. (Pipe Dia. = 48")			2	EA	$5,120.00	$10,240.00	
Concrete Box Culverts							
Box Culvert Pipe							
Individual Box Span (ft)	Box Height (ft)	No. of Barrels	Length (ft)				
7	4	2	75	L.F.	$1,450.54	$108,790.00	CR44
8	5	5	100	L.F.	$4,150.14	$415,014.00	S. Quentine
11	5	1	525	L.F.	$1,074.60	$564,164.00	Pheasant Hills outlet, Hillsboro crossing structure
10	5	1	200	L.F.	$1,000.10	$200,019.00	CR46 @ Irene
12	7	1	200	L.F.	$1,352.88	$270,576.00	alice crossing
Headwall and Toewalls							
Individual Box Span (ft)	No. of Barrels	Total Span (ft)					
7	2	17.00	2	EA	$1,433.73	$2,867.00	
8	5	45.00	2	EA	$3,814.43	$7,629.00	
11	1	13.00	2	EA	$1,181.23	$2,362.00	
10	1	12.00	2	EA	$1,090.37	$2,181.00	
12	1	14.00	2	EA	$1,263.11	$2,526.00	
Wingwalls (includes wingwalls on either side of channel and concrete apron)							
Individual Box Span (ft)	Box Rise (ft)	No. of Barrels					
7	4	2	2	EA	$9,377.90	$18,755.80	
8	5	5	2	EA	$18,579.62	$37,159.20	
11	5	1	2	EA	$11,058.60	$22,117.20	
10	5	1	2	EA	$10,823.57	$21,647.10	
12	7	1	2	EA	$15,951.55	$31,903.10	
Hydraulic Structures							
Sloping Drop Structures							
Height (ft)	Bottom Width (ft)	Yn (ft)					
12	40	5	1	EA	$221,947.29	$221,947.00	Drop into Pheasant Hills Pond
Channel Improvements							
Excavation, Low Range			7500	C.Y.	$13.00	$97,500.00	Josephine outfall
Excavation, Low Range			111000	C.Y.	$13.00	$1,443,000.00	Pheasant Hills Outfall
Soil Riprap, Type M			200	C.Y.	$83.00	$16,600.00	Outfall channels
Soil Riprap, Type M			500	C.Y.	$83.00	$41,500.00	Armoring for CR44 overflow
Detention/Water Quality Facilities							
Detention (Complete-in-Place)							
Detention Facility 1 (Complete-in-Place)			16	AC-FT	$54,300.00	$868,800.00	Lola Park Pond
Detention (User Entered Quantities)							
Outlet Works			2	EA	$25,000.00	$50,000.00	Pheasant Hills & Lola Pond Outlet
Landscaping and Maintenance Improvements							
Reclamation & seeding (native grasses)			10	ACRE	$1,190.00	$11,900.00	
Special Items (User Defined)							
Platte/Thompson Transition Structure	<----User Defined Items		45	CY	$800.00	$36,000.00	
Boring 54" Pipes under UPRR	<----User Defined Items		1	EA	$450,000.00	$450,000.00	
Broad Street Trainsition	<----User Defined Items		35	CY	$800.00	$28,000.00	
Asphalt Patch (Josephine)	<----User Defined Items		2500	SY	$45.00	$112,500.00	
Raise Pheasant Hills Berm	<----User Defined Items		3000	CY	$20.00	$60,000.00	
Land Acquisition							
Easement/ROW Acquisition			10.00	ACRE	$1,444.00	$14,440.00	Lola Park Pond

Master Plan Capital Improvement Cost Summary

Capital Improvement Costs				
Pipe Culverts and Storm Drains				$411,107.00
Concrete Box Culverts				$1,707,710.00
Hydraulic Structures				$221,947.00
Channel Improvements				$1,598,600.00
Detention/Water Quality Facilities				$918,800.00
Removals				$0.00
Landscaping and Maintenance Improvements				$11,900.00
Special Items (User Defined)				$686,500.00
Subtotal Capital Improvement Costs				**$5,556,564.00**
Additional Capital Improvement Costs				
Dewatering		$12,334.00	L.S.	$12,334.00
Mobilization		5%		$277,828.00
Traffic Control		$20,000.00	L.S.	$20,000.00
Utility Coordination/Relocation		$200,000.00	L.S.	$200,000.00
Stormwater Management/Erosion Control		5%		$277,828.00
Subtotal Additional Capital Improvement Costs				**$787,990.00**
Land Acquisition Costs				
ROW/Easements				$14,440.00
Subtotal Land Acquisition Costs				**$14,440.00**
Other Costs (percentage of Capital Improvement Costs)				
Engineering		15%		$951,683.00
Legal/Administrative		5%		$317,228.00
Contract Admin/Construction Management		10%		$634,455.00
Contingency		25%		$1,586,139.00
Subtotal Other Costs				**$3,489,505.00**
Total Capital Improvement Costs				**$9,848,499.00**

Master Plan Operation and Maintenance Cost Summary

Description	Quantity	Unit	Unit Cost	Total Annual Cost
Culvert Maintenance (e.g. sediment & debris removal, erosion at entrance/exit, structural repairs, etc.)	3680	L.F.	$1.00	$1,840.00
Channel Maintenance (e.g. sediment & debris removal, erosion, tree & weed removal, etc.)	7300	L.F.	$2.00	$7,300.00
Detention/WQ Maintenance (e.g. sediment & debris removal, mucking out, tree & weed removal, structu	5	ACRE	$1,790.00	$1,790.00
Total Annual Operation and Maintenance Cost				**$10,930.00**
Effective Interest Rate				0.00%
Total Operation and Maintenance Costs Over 50 Years				**$546,500.00**

MASTER PLAN COST ESTIMATE FOR INDIVIDUAL REACH

PROJECT :	Milliken Master Plan - Recommended Plan
DRAINAGEWAY :	Eastern Tributary
REACH :	Eastern Tributary
JURISDICTION :	Milliken
REACH ID:	East-ReachEastern Tributary TGM — DATE : 9/1/2014

DESCRIPTION			QUANTITY	UNIT	UNIT COST	TOTAL COST	USER COMMENTS
Concrete Box Culverts							
Box Culvert Pipe							
Individual Box Span (ft)	Box Height (ft)	No. of Barrels	Length (ft)				
8	5	1	300	L.F.	$830.03	$249,008.00	Centennial Farms
5	4	4	100	L.F.	$2,444.21	$244,421.00	CR46
7	5	7	100	L.F.	$5,484.12	$548,412.00	Broad St
7	4	4	100	L.F.	$2,901.07	$290,107.00	Cherry St
7	4	5	130	L.F.	$3,626.34	$471,424.00	CR48
7	4	4	100	L.F.	$2,901.07	$290,107.00	Alice North
7	4	5	80	L.F.	$3,626.34	$290,107.00	Platte/Thompson Ditch
Headwall and Toewalls							
Individual Box Span (ft)	No. of Barrels	Total Span (ft)					
8	1	10.00	2	EA	$847.65	$1,695.00	
5	4	24.00	2	EA	$1,941.91	$3,884.00	
7	7	56.00	2	EA	$4,722.87	$9,446.00	
7	4	32.00	2	EA	$2,698.78	$5,398.00	
7	5	40.00	2	EA	$3,373.48	$6,747.00	
7	4	32.00	2	EA	$2,698.78	$5,398.00	
Wingwalls (includes wingwalls on either side of channel and concrete apron)							
Individual Box Span (ft)	Box Rise (ft)	No. of Barrels					
8	5	1	2	EA	$10,353.50	$20,707.00	
5	4	4	2	EA	$11,061.74	$22,123.50	
7	5	7	2	EA	$21,164.97	$42,329.90	
7	4	4	2	EA	$12,745.59	$25,491.20	
7	4	5	2	EA	$14,218.96	$28,437.90	
7	4	4	2	EA	$12,745.59	$25,491.20	
Channel Improvements							
Excavation, Low Range			14900	C.Y.	$13.00	$193,700.00	Ehrlich Pond Outfall
Excavation, Low Range			6500	C.Y.	$13.00	$84,500.00	Centennial Farms outfall
Removals							
Removal of culvert pipe (48"<D<84")			400	L.F.	$60.00	$24,000.00	
Landscaping and Maintenance Improvements							
Reclamation & seeding (native grasses)			4	ACRE	$1,190.00	$4,760.00	
Special Items (User Defined)							
Boring new Ehrlich Outlet	<----User Defined Items		8	EA	$400,000.00	$3,200,000.00	8-48" steel pipes
Land Acquisition							
Easement/ROW Acquisition			3.70	ACRE	$2,601.00	$9,624.00	Ehrlich Pond Outfall

Master Plan Capital Improvement Cost Summary

Capital Improvement Costs				
Pipe Culverts and Storm Drains			$0.00	
Concrete Box Culverts			$2,580,735.00	
Hydraulic Structures			$0.00	
Channel Improvements			$278,200.00	
Detention/Water Quality Facilities			$0.00	
Removals			$24,000.00	
Landscaping and Maintenance Improvements			$4,760.00	
Special Items (User Defined)			$3,200,000.00	
Subtotal Capital Improvement Costs			**$6,087,695.00**	
Additional Capital Improvement Costs				
Dewatering	$13,016.00	L.S.	$13,016.00	
Mobilization	5%		$304,385.00	
Traffic Control	$20,000.00	L.S.	$20,000.00	
Utility Coordination/Relocation	$200,000.00	L.S.	$200,000.00	
Stormwater Management/Erosion Control	5%		$304,385.00	
Subtotal Additional Capital Improvement Costs			**$841,786.00**	
Land Acquisition Costs				
ROW/Easements			$9,624.00	
Subtotal Land Acquisition Costs			**$9,624.00**	
Other Costs (percentage of Capital Improvement Costs)				
Engineering	15%		$1,039,422.00	
Legal/Administrative	5%		$346,474.00	
Contract Admin/Construction Management	10%		$692,948.00	
Contingency	25%		$1,732,370.00	
Subtotal Other Costs			**$3,811,214.00**	
Total Capital Improvement Costs			**$10,750,319.00**	

Master Plan Operation and Maintenance Cost Summary

Description	Quantity	Unit	Unit Cost	Total Annual Cost
Culvert Maintenance (e.g. sediment & debris removal, erosion at entrance/exit, structural repairs, e	3100	L.F.	$1.00	$1,550.00
Channel Maintenance (e.g. sediment & debris removal, erosion, tree & weed removal, etc.)	1900	L.F.	$2.00	$1,900.00
Total Annual Operation and Maintenance Cost				**$3,450.00**
Effective Interest Rate				0.00%
Total Operation and Maintenance Costs Over 50 Years				**$172,500.00**

Table D.1 – Baseline Hydrology SWMM Input/Output

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)
--------------------------------------------------------------

INP file created on 6/18/2014 7:11:51 AM by jdeischer with inpPINS version 0.0.2.0
Title/Notes:

*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Flow Routing Method ...... KINWAVE
Starting Date ............ JUN-01-2014 00:00:00
Ending Date .............. JUN-02-2014 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Routing Time Step ........ 5.00 sec


WARNING 04: minimum elevation drop used for Conduit CE804

WARNING 04: minimum elevation drop used for Conduit D025

WARNING 04: minimum elevation drop used for Conduit D030

WARNING 04: minimum elevation drop used for Conduit D040

WARNING 08: elevation drop exceeds length for Conduit D330

WARNING 08: elevation drop exceeds length for Conduit L335

WARNING 02: maximum depth increased for Node 941

WARNING 02: maximum depth increased for Node 942

*************
Element Count
*************
Number of rain gages ...... 0
Number of subcatchments ... 0
Number of nodes ........... 212
Number of links ........... 200
Number of pollutants ...... 0
Number of land uses ....... 0


************
Node Summary
************
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Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
005	JUNCTION	4739.40	7.00	0.0	
015	JUNCTION	4746.20	7.50	0.0	
020	JUNCTION	4744.71	0.00	0.0	
025	JUNCTION	4742.88	0.00	0.0	
030	JUNCTION	4742.20	0.00	0.0	
040	JUNCTION	4742.17	0.00	0.0	
045	JUNCTION	4752.78	0.00	0.0	
100	JUNCTION	4763.70	5.00	0.0	
101	JUNCTION	4795.89	2.00	0.0	
102	JUNCTION	4792.00	2.00	0.0	
105	JUNCTION	4760.50	5.00	0.0	
115	JUNCTION	4857.00	10.00	0.0	
116	JUNCTION	4826.00	10.00	0.0	
117	JUNCTION	4828.00	10.00	0.0	
125	JUNCTION	4806.80	0.00	0.0	
135	JUNCTION	4890.00	10.00	0.0	
136	JUNCTION	4828.00	5.00	0.0	
137	JUNCTION	4839.00	10.00	0.0	
140	JUNCTION	4887.20	5.00	0.0	
145	JUNCTION	4890.30	5.00	0.0	
200	JUNCTION	4766.52	0.00	0.0	
205	JUNCTION	4751.00	2.00	0.0	
206	JUNCTION	4748.40	3.00	0.0	
215	JUNCTION	4771.20	0.00	0.0	
220	JUNCTION	4775.70	0.00	0.0	
300	JUNCTION	4721.60	10.00	0.0	
305	JUNCTION	4737.70	5.00	0.0	
320	JUNCTION	4750.40	4.00	0.0	
325	JUNCTION	4760.00	5.00	0.0	
330	JUNCTION	4754.50	0.00	0.0	
335	JUNCTION	4762.00	0.00	0.0	
340	JUNCTION	4758.20	0.00	0.0	
345	JUNCTION	4766.50	0.00	0.0	
350	JUNCTION	4767.80	5.00	0.0	
355	JUNCTION	4795.00	5.00	0.0	
360	JUNCTION	4810.00	5.00	0.0	
405	JUNCTION	4725.10	0.00	0.0	
415	JUNCTION	4731.50	0.00	0.0	
500	JUNCTION	4772.80	0.00	0.0	
505	JUNCTION	4790.00	5.00	0.0	
510	JUNCTION	4784.10	0.00	0.0	
600	JUNCTION	4738.50	0.00	0.0	
625	JUNCTION	4794.60	0.00	0.0	
630	JUNCTION	4803.80	5.00	0.0	
635	JUNCTION	4859.80	5.00	0.0	
640	JUNCTION	4908.70	5.00	0.0	
650	JUNCTION	4773.50	0.00	0.0	
655	JUNCTION	4779.30	5.00	0.0	
660	JUNCTION	4795.10	5.00	0.0	
665	JUNCTION	4861.30	5.00	0.0	
675	JUNCTION	4800.50	0.00	0.0	
803	JUNCTION	4777.50	0.00	0.0	
804	JUNCTION	4712.10	5.00	0.0	
805	JUNCTION	4777.30	5.00	0.0	
806	JUNCTION	4734.50	0.00	0.0	
807	JUNCTION	4733.10	5.00	0.0	
808	JUNCTION	4725.40	0.00	0.0	
809	JUNCTION	4724.50	0.00	0.0	
810	JUNCTION	4721.80	0.00	0.0	

Table D.1 – Baseline Hydrology SWMM Input/Output

811	JUNCTION	4712.90	5.00	0.0
812	JUNCTION	4759.00	5.00	0.0
813	JUNCTION	4760.50	0.00	0.0
814	JUNCTION	4729.80	0.00	0.0
815	JUNCTION	4770.10	5.00	0.0
818	JUNCTION	4716.10	5.00	0.0
821	JUNCTION	4765.10	0.00	0.0
824	JUNCTION	4731.90	0.00	0.0
825	JUNCTION	4738.10	0.00	0.0
834	JUNCTION	4734.00	0.00	0.0
835	JUNCTION	4715.60	0.00	0.0
836	JUNCTION	4736.90	0.00	0.0
837	JUNCTION	4727.10	0.00	0.0
838	JUNCTION	4724.60	0.00	0.0
900	JUNCTION	4750.33	6.00	0.0
902	JUNCTION	4745.50	12.00	0.0
903	JUNCTION	4733.31	5.00	0.0
904	JUNCTION	4737.20	10.00	0.0
905	JUNCTION	4737.00	4.00	0.0
910	JUNCTION	4788.00	5.00	0.0
915	JUNCTION	4725.30	5.00	0.0
917	JUNCTION	4790.00	5.00	0.0
918	JUNCTION	4785.40	5.00	0.0
920	JUNCTION	4856.00	5.00	0.0
922	JUNCTION	4756.40	10.00	0.0
925	JUNCTION	4739.90	3.00	0.0
926	JUNCTION	4744.00	5.00	0.0
927	JUNCTION	4745.00	10.00	0.0
928	JUNCTION	4800.71	5.00	0.0
929	JUNCTION	4801.58	6.00	0.0
930	JUNCTION	4744.59	4.00	0.0
931	JUNCTION	4746.62	20.00	0.0
933	JUNCTION	4729.78	10.00	0.0
935	JUNCTION	4726.81	10.00	0.0
937	JUNCTION	4728.79	10.00	0.0
939	JUNCTION	4733.63	10.00	0.0
945	JUNCTION	4744.45	5.00	0.0
946	JUNCTION	4743.32	6.00	0.0
947	JUNCTION	4743.27	6.00	0.0
949	JUNCTION	4741.36	12.00	0.0
956	JUNCTION	4751.00	5.00	0.0
PRV	JUNCTION	4870.00	5.00	0.0
L137_Pond	JUNCTION	4834.00	5.00	0.0
970	JUNCTION	4850.00	5.00	0.0
972	JUNCTION	4798.20	5.00	0.0
974	JUNCTION	4802.00	5.00	0.0
130	JUNCTION	4808.00	5.00	0.0
977	JUNCTION	4804.00	4.00	0.0
120	JUNCTION	4806.00	5.00	0.0
981	JUNCTION	4804.00	5.00	0.0
225	JUNCTION	4824.00	5.00	0.0
982	JUNCTION	4786.00	5.00	0.0
983	JUNCTION	4787.00	10.00	0.0
984	JUNCTION	4788.00	5.00	0.0
985	JUNCTION	4779.80	10.00	0.0
986	JUNCTION	4783.00	5.00	0.0
987	JUNCTION	4750.00	5.00	0.0
988	JUNCTION	4779.10	5.00	0.0
989	JUNCTION	4780.00	4.00	0.0
110	JUNCTION	4790.00	5.00	0.0
990	JUNCTION	4771.00	5.00	0.0
991	JUNCTION	4738.00	0.00	0.0
17	JUNCTION	4742.00	7.00	0.0
18	JUNCTION	4768.00	6.00	0.0
19	JUNCTION	4781.00	5.00	0.0
976.2	JUNCTION	4798.00	5.00	0.0
136.2	JUNCTION	4820.00	10.00	0.0
901	JUNCTION	4747.25	6.00	0.0
932	JUNCTION	4746.61	20.00	0.0
916	JUNCTION	4744.74	10.00	0.0
20	JUNCTION	4734.50	4.00	0.0
21	JUNCTION	4770.00	5.00	0.0
22	JUNCTION	4772.00	10.00	0.0
957	JUNCTION	4745.97	10.00	0.0
959	JUNCTION	4743.69	4.00	0.0
934	JUNCTION	4728.20	10.00	0.0
936	JUNCTION	4729.32	10.00	0.0
310	JUNCTION	4730.18	10.00	0.0
938	JUNCTION	4734.40	10.00	0.0
23	JUNCTION	4740.75	5.00	0.0
24	JUNCTION	4738.70	5.00	0.0
25	JUNCTION	4737.70	5.00	0.0
26	JUNCTION	4785.00	5.00	0.0
27	JUNCTION	4778.00	5.00	0.0
28	JUNCTION	4734.25	5.00	0.0
950	JUNCTION	4752.81	4.50	0.0
001	JUNCTION	4733.81	5.00	0.0
940	JUNCTION	4768.92	2.50	0.0
BT001	OUTFALL	4779.20	0.00	0.0
BT005	OUTFALL	4773.40	0.00	0.0
BT010	OUTFALL	4794.50	0.00	0.0
BT015	OUTFALL	4738.40	0.00	0.0
BT020	OUTFALL	4738.00	0.00	0.0
BT025	OUTFALL	4731.80	0.00	0.0
BT030	OUTFALL	4765.00	0.00	0.0
BT035	OUTFALL	4721.50	0.00	0.0
BT040	OUTFALL	4716.00	0.00	0.0
BT045	OUTFALL	4729.70	0.00	0.0
BT046	OUTFALL	4724.50	0.00	0.0
BT047	OUTFALL	4727.00	0.00	0.0
BT055	OUTFALL	4715.50	5.00	0.0
BT060	OUTFALL	4712.80	0.00	0.0
BT065	OUTFALL	4721.70	0.00	0.0
BT070	OUTFALL	4724.40	0.00	0.0
BT075	OUTFALL	4725.30	0.00	0.0
BT080	OUTFALL	4712.10	0.00	0.0
BT085	OUTFALL	4684.80	5.00	0.0
LT001	OUTFALL	4752.60	0.00	0.0
LT005	OUTFALL	4741.00	5.00	0.0
LT010	OUTFALL	4740.20	0.00	0.0
LT015	OUTFALL	4738.33	6.00	0.0
LT020	OUTFALL	4729.00	5.00	0.0
SPR001	OUTFALL	4731.60	1.00	0.0
SPR005	OUTFALL	4737.90	3.00	0.0
SPR010	OUTFALL	4736.80	0.00	0.0
IRR_RETURN	OUTFALL	4741.75	2.00	0.0
010	DIVIDER	4746.29	4.00	0.0
951	DIVIDER	4742.88	11.02	0.0
952	DIVIDER	4742.20	12.60	0.0
953	DIVIDER	4742.17	14.63	0.0
210	DIVIDER	4758.60	2.00	0.0
919	DIVIDER	4740.52	8.80	0.0
923	DIVIDER	4757.26	5.00	0.0
941	DIVIDER	4761.90	8.60	0.0

Table D.1 – Baseline Hydrology SWMM Input/Output

942	DIVIDER	4765.24	4.50	0.0
943	DIVIDER	4767.57	4.50	0.0
948	DIVIDER	4744.55	12.00	0.0
CL_Outlet	DIVIDER	4731.70	12.20	0.0
944	DIVIDER	4757.24	12.00	0.0
976	DIVIDER	4801.79	10.00	0.0
978	DIVIDER	4801.71	5.00	0.0
225_SPLIT	DIVIDER	4792.40	2.50	0.0
115_Pond	STORAGE	4850.00	7.00	0.0
116_POND	STORAGE	4798.20	7.00	0.0
117_POND	STORAGE	4802.00	7.00	0.0
120_POND	STORAGE	4804.00	7.00	0.0
130_POND	STORAGE	4804.00	5.00	0.0
137_Pond	STORAGE	4834.00	10.00	0.0
225_POND	STORAGE	4795.00	5.00	0.0
335_POND	STORAGE	4750.00	10.00	0.0
355_POND	STORAGE	4788.00	8.00	0.0
360_POND	STORAGE	4783.00	5.00	0.0
Centennial	STORAGE	4725.00	12.00	0.0
CF	STORAGE	4760.00	5.52	0.0
Ehrlich	STORAGE	4740.00	13.00	0.0
PH	STORAGE	4783.00	15.00	0.0
PlatteRiverVillagePond	STORAGE	4870.00	10.00	0.0
SV_S	STORAGE	4731.00	7.00	0.0
505_POND	STORAGE	4780.00	5.00	0.0
110_POND	STORAGE	4776.00	5.00	0.0
325_POND	STORAGE	4751.00	5.00	0.0
836_POND	STORAGE	4738.00	10.00	0.0
LolaParkPond	STORAGE	4754.00	6.00	0.0

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Link Summary
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Name	From Node	To Node	Type	Length	%Slope	Roughness
CE001	001	903	CONDUIT	83.0	0.6024	0.0130
CE405	405	Centennial	CONDUIT	10.0	1.0001	0.0400
CE415	415	SV_S	CONDUIT	10.0	5.0063	0.0400
CE500	500	LT010	CONDUIT	470.0	6.9529	0.0100
CE505	27	LT005	CONDUIT	1772.0	2.0885	0.0350
CE510	510	LT001	CONDUIT	1000.0	3.1516	0.0100
CE600	600	BT015	CONDUIT	100.0	0.1000	0.0100
CE625	625	BT010	CONDUIT	100.0	0.1000	0.0100
CE630	630	625	CONDUIT	100.0	9.2392	0.0400
CE635	635	630	CONDUIT	2120.0	2.6424	0.0400
CE640	640	630	CONDUIT	2771.0	3.7884	0.0400
CE650	650	BT005	CONDUIT	100.0	0.1000	0.0100
CE655	655	BT001	CONDUIT	100.0	0.1000	0.0100
CE660	660	910	CONDUIT	287.0	2.4746	0.0400
CE665	665	660	CONDUIT	2393.0	2.7675	0.0100
CE675	675	910	CONDUIT	100.0	12.5988	0.0400
CE803	803	805	CONDUIT	100.0	0.2000	0.0400
CE804	804	BT080	CONDUIT	100.0	0.0010	0.0100
CE805	805	BT085	CONDUIT	2405.0	3.8490	0.0400
CE806	806	807	CONDUIT	100.0	1.4001	0.0400
CE807	807	804	CONDUIT	2738.0	0.7670	0.0400
CE808	808	BT075	CONDUIT	100.0	0.1000	0.0100
CE809	809	BT070	CONDUIT	100.0	0.1000	0.0100
CE810	810	BT065	CONDUIT	100.0	0.1000	0.0100
CE811	811	BT060	CONDUIT	100.0	0.1000	0.0100
CE813	813	812	CONDUIT	100.0	1.5002	0.0100
CE814	814	BT045	CONDUIT	100.0	0.1000	0.0100
CE815	815	818	CONDUIT	4103.0	1.3162	0.0400
CE818	818	BT040	CONDUIT	100.0	0.1000	0.0100
CE821	821	BT030	CONDUIT	100.0	0.1000	0.0100
CE824	824	BT025	CONDUIT	100.0	0.1000	0.0100
CE825	825	BT020	CONDUIT	100.0	0.1000	0.0100
CE834	834	Centennial	CONDUIT	100.0	9.0367	0.0100
CE835	835	BT055	CONDUIT	10.0	1.0001	0.0100
CE837	837	BT047	CONDUIT	10.0	1.0001	0.0100
CE838	838	BT046	CONDUIT	100.0	0.1000	0.0100
CE910	910	655	CONDUIT	1067.0	0.8154	0.0400
CE911	812	811	CONDUIT	3487.0	1.3222	0.0400
CE915	915	BT055	CONDUIT	1025.0	0.9561	0.0400
CL_Out	CL_Outlet	915	CONDUIT	680.0	0.9412	0.0160
CL_Spill	CL_Outlet	SPR001	CONDUIT	100.0	11.3728	0.0400
D020	020	916	CONDUIT	10.0	-0.3000	0.0100
D025	025	951	CONDUIT	10.0	0.0100	0.0100
D030	030	952	CONDUIT	10.0	0.0100	0.0100
D040	040	953	CONDUIT	10.0	0.0100	0.0100
D200	200	944	CONDUIT	10.0	249.0739	0.0100
D215	215	941	CONDUIT	10.0	253.0202	0.0100
D220	220	943	CONDUIT	10.0	139.6275	0.0100
D330	330	Ehrlich	CONDUIT	10.0	145.0000	0.0100
L335	335	335_POND	CONDUIT	10.0	120.0000	0.0100
D340	340	923	CONDUIT	10.0	9.4418	0.0100
D345	345	CF	CONDUIT	10.0	85.5337	0.0100
LOLA_SPILL	18	17	CONDUIT	3521.0	0.7669	0.0350
E300	300	BT035	CONDUIT	10.0	1.0001	0.0100
E305	305	300	CONDUIT	400.0	4.0283	0.0400
E310	310	933	CONDUIT	80.0	0.5000	0.0130
E320	320	Ehrlich	CONDUIT	122.0	8.5557	0.0200
E350	350	CF	CONDUIT	1140.0	0.6842	0.0200
E355	983	985	CONDUIT	1630.0	0.4417	0.0400
E360	985	22	CONDUIT	2018.0	0.3865	0.0400
E904	904	938	CONDUIT	400.0	0.7000	0.0160
E922	922	957	CONDUIT	1877.0	0.5557	0.0400
E923	923	922	CONDUIT	455.0	0.1890	0.0160
E923_OF	923	922	CONDUIT	455.0	1.0682	0.0400
E927	927	948	CONDUIT	1545.0	0.0291	0.0400
E933	933	936	CONDUIT	380.0	0.1211	0.0160
E934	934	935	CONDUIT	130.0	1.0693	0.0130
E935	935	300	CONDUIT	1850.0	0.2816	0.0160
E936	936	937	CONDUIT	100.0	0.5300	0.0130
E937	937	934	CONDUIT	375.0	0.1573	0.0160
E938	938	939	CONDUIT	100.0	0.7700	0.0130
E939	939	310	CONDUIT	340.0	1.0148	0.0400
E948	948	949	CONDUIT	330.0	0.9667	0.0160
E948_OF	948	949	CONDUIT	330.0	0.9667	0.0400
E956	956	Ehrlich	CONDUIT	500.0	2.2005	0.0200
E957	957	927	CONDUIT	100.0	0.9700	0.0130
E959	959	23	CONDUIT	250.0	1.1761	0.0120
Eh_In	949	Ehrlich	CONDUIT	10.0	13.7275	0.0100
L010	010	930	CONDUIT	90.0	1.8892	0.0160
L010_OF	010	930	CONDUIT	90.0	1.8892	0.0200
L015	015	001	CONDUIT	877.0	1.6981	0.0400
L019	005	001	CONDUIT	885.0	0.8577	0.0400
L045_OF	045	950	CONDUIT	10.0	-0.3000	0.0100
L100	100	LolaParkPond	CONDUIT	1526.0	0.6357	0.0400
L105	105	LolaParkPond	CONDUIT	376.0	1.7290	0.0400
L917	917	PH	CONDUIT	1126.0	0.6217	0.0400
980	978	928	CONDUIT	50.0	2.0004	0.0160
980_OF	978	928	CONDUIT	50.0	2.0004	0.0200

Table D.1 – Baseline Hydrology SWMM Input/Output

L125	125	976	CONDUIT	636.0	0.7878	0.0400
L976	976	929	CONDUIT	50.0	0.4200	0.0160
CR21cROSSING	976	976.2	CONDUIT	100.0	3.7927	0.0130
L135	135	PlatteRiverVillagePondCONDUIT		2814.0	0.7108	0.0400
L140	140	920	CONDUIT	2733.0	1.1417	0.0400
L145	145	920	CONDUIT	4036.0	0.8499	0.0400
L205	205	926	CONDUIT	200.0	3.5021	0.0200
L206	206	010	CONDUIT	330.0	0.6394	0.0400
L900	900	901	CONDUIT	288.0	1.0695	0.0400
L901	901	931	CONDUIT	75.0	0.8400	0.0160
L902	902	916	CONDUIT	173.0	1.5956	0.0400
L903	903	LT020	CONDUIT	559.0	0.7710	0.0400
L905	28	001	CONDUIT	1205.0	0.0365	0.0350
L916	916	905	CONDUIT	100.0	7.7633	0.0160
L918	19	990	CONDUIT	1968.0	0.5081	0.0350
L920	920	136	CONDUIT	4889.0	0.5727	0.0400
L926	926	001	CONDUIT	1264.0	0.8062	0.0400
L928	928	917	CONDUIT	663.0	1.6156	0.0400
L929	929	978	CONDUIT	444.0	0.1959	0.0400
L930	930	926	CONDUIT	120.0	0.4917	0.0400
L931	931	932	CONDUIT	55.0	0.0182	0.0400
L932	932	902	CONDUIT	160.0	0.6938	0.0130
L950	950	900	CONDUIT	281.0	0.8826	0.0160
L951	951	952	CONDUIT	551.0	0.1234	0.0160
L951_OF	951	005	CONDUIT	1022.0	0.9296	0.0200
L952	952	953	CONDUIT	356.0	0.0084	0.0160
L952_OF	952	005	CONDUIT	1241.0	0.8381	0.0200
L953	953	IRR_RETURN	CONDUIT	607.0	0.0692	0.0160
L953_OF	953	005	CONDUIT	1374.0	0.9025	0.0200
Q210	210	944	CONDUIT	55.0	2.4735	0.0160
Q210_OF	210	944	CONDUIT	50.0	2.7210	0.0200
Q225	225_SPLIT	940	CONDUIT	1190.0	1.9735	0.0200
Q225_OF	225_SPLIT	941	CONDUIT	2723.0	1.1202	0.0200
Q919	919	LT015	CONDUIT	115.0	1.9047	0.0160
Q919_OF	919	LT015	CONDUIT	115.0	4.3432	0.0400
Q940	940	943	CONDUIT	673.0	0.2006	0.0120
Q941	941	944	CONDUIT	2074.0	0.2247	0.0120
Q941_OF	941	944	CONDUIT	2074.0	0.2247	0.0400
Q942	942	941	CONDUIT	595.0	0.5614	0.0120
Q942_OF	942	941	CONDUIT	595.0	0.5614	0.0350
Q943	943	942	CONDUIT	570.0	0.4088	0.0120
Q943_OF	943	942	CONDUIT	570.0	0.4088	0.0350
Q944	944	945	CONDUIT	680.0	1.8812	0.0160
Q945	945	946	CONDUIT	400.0	0.2825	0.0400
Q946	946	947	CONDUIT	105.0	0.0476	0.0160
Q947	947	919	CONDUIT	40.0	6.8913	0.0400
SPR836	991	SPR010	CONDUIT	110.0	1.0910	0.0150
SPR925	925	SPR005	CONDUIT	110.0	1.8185	0.0160
944_OF	944	945	CONDUIT	650.0	3.5083	0.0350
L137	137	137_Pond	CONDUIT	1415.0	0.3534	0.0400
L136	136.2	976	CONDUIT	3443.0	0.5289	0.0400
L115	115	115_Pond	CONDUIT	1145.0	0.6114	0.0400
L116	116	116_POND	CONDUIT	1700.0	1.6355	0.0400
L117	117	117_POND	CONDUIT	1832.0	1.4194	0.0400
L988	101	102	CONDUIT	400.0	0.9725	0.0100
48	102	100	CONDUIT	3717.0	0.7614	0.0250
CR42_CROSSING	PRV	920	CONDUIT	100.0	14.1393	0.0130
921	L137_Pond	136	CONDUIT	300.0	2.0004	0.0130
971	970	917	CONDUIT	3347.0	1.7929	0.0400
973	972	917	CONDUIT	200.0	4.1035	0.0400
975	974	917	CONDUIT	300.0	4.0032	0.0400
L130	130	130_POND	CONDUIT	1584.0	0.2525	0.0400
978	977	976	CONDUIT	200.0	1.1051	0.0130
L120	120	120_POND	CONDUIT	600.0	0.3333	0.0400
982	981	978	CONDUIT	400.0	0.5725	0.0100
L225	225	225_POND	CONDUIT	3141.0	0.9233	0.0400
L982	26	988	CONDUIT	900.0	0.6556	0.0130
L355	355	355_POND	CONDUIT	400.0	1.7503	0.0100
L984	984	983	CONDUIT	520.0	0.1923	0.0400
L360	360	360_POND	CONDUIT	3453.0	0.7820	0.0400
L986	986	985	CONDUIT	300.0	1.0667	0.0400
L987	987	957	CONDUIT	400.0	1.0076	0.0100
L505	505	505_POND	CONDUIT	1010.0	0.9901	0.0400
51	989	988	CONDUIT	200.0	0.4500	0.0130
L110	110	110_POND	CONDUIT	1150.0	1.2175	0.0400
L325	325	325_POND	CONDUIT	400.0	2.2506	0.0100
52	836	836_POND	CONDUIT	400.0	-0.2750	0.0100
53	918	19	CONDUIT	400.0	1.1001	0.0130
54	990	18	CONDUIT	200.0	1.5002	0.0130
55	17	Ehrlich	CONDUIT	200.0	1.0001	0.0130
L130_OF	976.2	917	CONDUIT	820.0	0.9757	0.0350
CR44	136	136.2	CONDUIT	100.0	8.0257	0.0130
56	905	20	CONDUIT	450.0	0.5556	0.0130
57	22	21	CONDUIT	300.0	0.6667	0.0130
58	21	922	CONDUIT	1000.0	1.3601	0.0350
59	23	24	CONDUIT	850.0	0.2412	0.0350
60	24	25	CONDUIT	300.0	0.3333	0.0350
61	25	904	CONDUIT	300.0	0.1667	0.0130
62	982	26	CONDUIT	150.0	0.6667	0.0130
63	988	27	CONDUIT	100.0	1.1001	0.0130
64	20	28	CONDUIT	100.0	0.2500	0.0130
Centennial_Out	Centennial	CL_Outlet	OUTLET			
CF_OUT	CF	923	OUTLET			
EL_OUT	Ehrlich	959	OUTLET			
SV_S_Outlet	SV_S	925	OUTLET			
PRV_OUT	PlatteRiverVillagePondPRV		OUTLET			
137_Out	137_Pond	L137_Pond	OUTLET			
115_Out	115_Pond	970	OUTLET			
116_OUT	116_POND	972	OUTLET			
117_OUT	117_POND	974	OUTLET			
130_OUT	130_POND	977	OUTLET			
120_OUT	120_POND	981	OUTLET			
225_OUT	225_POND	982	OUTLET			
355_OUT	355_POND	984	OUTLET			
360_OUT	360_POND	986	OUTLET			
335_OUT	335_POND	987	OUTLET			
505_OUT	505_POND	989	OUTLET			
110_OUT	110_POND	990	OUTLET			
325_OUT	325_POND	956	OUTLET			
836_OUT	836_POND	991	OUTLET			
PH_Weir	PH	918	OUTLET			
1	LolaParkPond	950	OUTLET			

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Cross Section Summary
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Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
CE001	CIRCULAR	4.50	15.90	1.13	4.50	3	152.63
CE405	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE415	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE500	DUMMY	0.00	0.00	0.00	0.00	1	0.00

Table D.1 – Baseline Hydrology SWMM Input/Output

CE505	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	1488.54
CE510	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE600	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE625	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE630	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE635	TRAPEZOIDAL	5.00	400.00	3.07	130.00	1	5097.10
CE640	TRAPEZOIDAL	5.00	400.00	3.07	130.00	1	6103.04
CE650	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE655	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE660	TRAPEZOIDAL	5.00	175.00	2.87	60.00	1	2065.08
CE665	TRAPEZOIDAL	5.00	400.00	3.07	130.00	1	20865.17
CE675	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE803	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE804	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE805	TRAPEZOIDAL	5.00	110.00	2.54	42.00	1	1494.25
CE806	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE807	TRAPEZOIDAL	5.00	175.00	2.87	60.00	1	1149.69
CE808	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE809	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE810	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE811	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE813	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE814	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE815	TRAPEZOIDAL	5.00	175.00	2.87	60.00	1	1506.08
CE818	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE821	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE824	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE825	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE834	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE835	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE837	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE838	DUMMY	0.00	0.00	0.00	0.00	1	0.00
CE910	TRAPEZOIDAL	5.00	175.00	2.87	60.00	1	1185.41
CE911	TRAPEZOIDAL	5.00	200.00	2.82	70.00	1	1705.21
CE915	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	881.28
CL_Out	CIRCULAR	1.50	1.77	0.38	1.50	1	8.28
CL_Spill	TRAPEZOIDAL	1.00	135.00	0.57	235.00	1	1168.76
D020	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D025	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D030	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D040	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D200	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D215	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D220	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D330	DUMMY	0.00	0.00	0.00	0.00	1	0.00
L335	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D340	DUMMY	0.00	0.00	0.00	0.00	1	0.00
D345	DUMMY	0.00	0.00	0.00	0.00	1	0.00
LOLA_SPILL	TRAPEZOIDAL	5.00	200.00	3.27	60.00	1	1636.97
E300	DUMMY	0.00	0.00	0.00	0.00	1	0.00
E305	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	7321.41
E310	RECT_CLOSED	4.00	28.00	1.27	7.00	5	265.79
E320	TRAPEZOIDAL	4.00	1680.00	2.05	820.00	1	58894.70
E350	TRAPEZOIDAL	5.00	550.00	2.62	210.00	1	6417.55
E355	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	4536.19
E360	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	4243.31
E904	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	14276.13
E922	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	5087.80
E923	HORIZ_ELLIPSE	3.00	11.42	0.92	5.00	1	43.58
E923_OF	TRAPEZOIDAL	1.00	70.00	0.58	120.00	1	187.62
E927	TRAPEZOIDAL	10.00	450.00	5.15	85.00	1	850.31
E933	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	5936.68
E934	RECT_CLOSED	4.00	28.00	1.27	7.00	4	388.69
E935	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	9055.03
E936	RECT_CLOSED	4.00	28.00	1.27	7.00	5	273.65
E937	TRAPEZOIDAL	10.00	500.00	5.41	90.00	1	5674.80
E938	RECT_CLOSED	4.00	28.00	1.27	7.00	4	329.84
E939	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	6875.39
E948	CIRCULAR	4.00	12.57	1.00	4.00	1	114.75
E948_OF	TRAPEZOIDAL	5.00	550.00	2.62	210.00	1	3814.06
E956	TRAPEZOIDAL	5.00	2600.00	2.55	1020.00	1	53472.11
E957	RECT_CLOSED	4.00	20.00	1.11	5.00	4	241.55
E959	CIRCULAR	4.00	12.57	1.00	4.00	8	168.76
Eh_In	DUMMY	0.00	0.00	0.00	0.00	1	0.00
L010	CIRCULAR	1.50	1.77	0.38	1.50	1	11.73
L010_OF	TRAPEZOIDAL	1.00	70.00	0.58	120.00	1	499.03
L015	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	4753.51
L019	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	3378.26
L045_OF	DUMMY	0.00	0.00	0.00	0.00	1	0.00
L100	TRAPEZOIDAL	5.00	110.00	2.54	42.00	1	607.24
L105	TRAPEZOIDAL	5.00	110.00	2.54	42.00	1	1001.49
L917	DUMMY	0.00	0.00	0.00	0.00	1	0.00
980	CIRCULAR	3.50	9.62	0.88	3.50	1	115.62
980_OF	TRAPEZOIDAL	1.00	70.00	0.58	120.00	1	513.50
L125	DUMMY	0.00	0.00	0.00	0.00	1	0.00
L976	CIRCULAR	2.00	3.14	0.50	2.00	1	11.91
CR21cROSSING	RECT_CLOSED	5.00	40.00	1.54	8.00	5	1186.69
L135	TRAPEZOIDAL	10.00	1000.00	6.58	150.00	1	10997.46
L140	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	3897.69
L145	TRAPEZOIDAL	5.00	500.00	3.32	150.00	1	3812.70
L205	TRAPEZOIDAL	2.00	100.00	1.11	90.00	1	1490.53
L206	TRAPEZOIDAL	3.00	150.00	1.58	95.00	1	603.36
L900	CE900	6.00	258.00	2.27	112.00	1	1713.05
L901	HORIZ_ELLIPSE	3.67	17.09	1.12	5.50	2	157.25
L902	TRAPEZOIDAL	10.00	600.00	5.36	110.00	1	8621.35
L903	TRAPEZOIDAL	5.00	200.00	3.27	60.00	1	1436.26
L905	TRAPEZOIDAL	5.00	265.00	3.57	73.00	1	502.19
L916	HORIZ_ELLIPSE	3.60	16.45	1.10	5.70	2	454.12
L918	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	2971.79
L920	TRAPEZOIDAL	5.00	475.00	2.79	170.00	1	2645.36
L926	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	3275.34
L928	TRAPEZOIDAL	5.00	362.50	2.67	135.00	1	3296.77
L929	TRAPEZOIDAL	5.00	110.00	2.54	42.00	1	337.15
L930	TRAPEZOIDAL	2.00	50.00	1.11	45.00	1	139.31
L931	TRAPEZOIDAL	20.00	1800.00	10.29	170.00	1	4265.78
L932	RECT_CLOSED	3.00	30.00	1.15	10.00	1	314.22
L950	CIRCULAR	4.50	15.90	1.13	4.50	2	150.11
L951	CIRCULAR	2.00	3.14	0.50	2.00	1	6.46
L951_OF	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	7034.15
L952	CIRCULAR	2.00	3.14	0.50	2.00	1	1.69
L952_OF	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	6678.89
L953	CIRCULAR	2.00	3.14	0.50	2.00	1	4.83
L953_OF	TRAPEZOIDAL	5.00	525.00	2.56	205.00	1	6930.94
Q210	CIRCULAR	2.00	3.14	0.50	2.00	1	28.91
Q210_OF	TRAPEZOIDAL	1.00	60.00	0.55	110.00	1	490.86
Q225	TRAPEZOIDAL	2.50	137.50	1.31	105.00	1	1716.49
Q225_OF	TRAPEZOIDAL	2.50	137.50	1.31	105.00	1	1293.19
Q919	CIRCULAR	4.00	12.57	1.00	4.00	2	161.07
Q919_OF	TRAPEZOIDAL	1.00	150.00	0.60	250.00	1	826.12
Q940	CIRCULAR	2.50	4.91	0.63	2.50	1	19.90
Q941	CIRCULAR	5.00	19.63	1.25	5.00	1	133.74
Q941_OF	TRAPEZOIDAL	5.00	110.00	2.54	42.00	1	361.03
Q942	CIRCULAR	4.00	12.57	1.00	4.00	1	116.59
Q942_OF	TRAPEZOIDAL	1.50	37.50	0.93	40.00	1	113.98

Table D.1 – Baseline Hydrology SWMM Input/Output

Q943	CIRCULAR	3.00	7.07	0.75	3.00	1	46.20
Q943_OF	TRAPEZOIDAL	1.50	37.50	0.93	40.00	1	97.27
Q944	HORIZ_ELLIPSE	4.00	20.31	1.22	6.33	1	296.06
Q945	TRAPEZOIDAL	5.00	150.00	2.93	50.00	1	606.18
Q946	RECT_CLOSED	6.00	60.00	1.88	10.00	2	184.90
Q947	TRAPEZOIDAL	5.00	150.00	2.93	50.00	1	2993.91
SPR836	DUMMY	0.00	0.00	0.00	0.00	1	0.00
SPR925	CIRCULAR	3.00	7.07	0.75	3.00	1	73.08
944_OF	TRAPEZOIDAL	2.00	26.00	1.21	21.00	1	234.75
L137	TRAPEZOIDAL	10.00	1000.00	6.58	150.00	1	7754.29
L136	TRAPEZOIDAL	10.00	1000.00	6.58	150.00	1	9486.88
L115	TRAPEZOIDAL	10.00	1100.00	5.21	210.00	1	9606.80
L116	TRAPEZOIDAL	10.00	700.00	5.74	120.00	1	10659.97
L117	TRAPEZOIDAL	10.00	500.00	5.41	90.00	1	6817.82
L988	TRAPEZOIDAL	2.00	12.00	1.10	10.00	1	186.99
48	TRAPEZOIDAL	1.50	57.00	1.02	56.00	1	298.70
CR42_CROSSING	CIRCULAR	5.00	19.63	1.25	5.00	1	979.32
921	TRAPEZOIDAL	5.00	150.00	2.93	50.00	1	4963.22
971	TRAPEZOIDAL	5.00	175.00	2.87	60.00	1	1757.78
973	TRAPEZOIDAL	5.00	150.00	2.93	50.00	1	2310.27
975	TRAPEZOIDAL	5.00	150.00	2.93	50.00	1	2281.88
L130	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	452.90
978	CIRCULAR	4.00	12.57	1.00	4.00	1	151.00
L120	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	520.35
982	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	2727.75
L225	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	866.02
L982	TRAPEZOIDAL	5.00	125.00	2.70	45.00	2	2245.32
L355	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	4769.42
L984	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	395.23
L360	TRAPEZOIDAL	5.00	150.00	2.93	50.00	1	1008.51
L986	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	930.85
L987	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	3618.65
L505	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	896.82
51	CIRCULAR	4.00	12.57	1.00	4.00	1	96.36
L110	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	994.45
L325	TRAPEZOIDAL	5.00	125.00	2.70	45.00	1	5408.28
52	DUMMY	0.00	0.00	0.00	0.00	1	0.00
53	RECT_CLOSED	5.00	55.00	1.72	11.00	1	946.14
54	RECT_CLOSED	5.00	50.00	1.67	10.00	1	984.04
55	RECT_CLOSED	7.00	84.00	2.21	12.00	1	1629.41
L130_OF	TRAPEZOIDAL	5.00	550.00	2.62	210.00	1	4379.05
CR44	RECT_CLOSED	4.00	28.00	1.27	7.00	2	1064.88
56	CIRCULAR	4.00	12.57	1.00	4.00	2	107.07
57	RECT_CLOSED	5.00	40.00	1.54	8.00	1	497.53
58	TRAPEZOIDAL	5.00	175.00	2.87	60.00	1	1749.70
59	TRAPEZOIDAL	5.00	325.00	3.77	85.00	1	1641.15
60	TRAPEZOIDAL	5.00	300.00	3.69	80.00	1	1757.03
61	RECT_CLOSED	5.00	35.00	1.46	7.00	7	210.04
62	CIRCULAR	5.00	19.63	1.25	5.00	1	212.65
63	CIRCULAR	5.00	19.63	1.25	5.00	1	273.16
64	CIRCULAR	2.25	3.98	0.56	2.25	12	15.49

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Transect Summary
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Transect CE900
Area:

0.0049	0.0102	0.0160	0.0222	0.0288
0.0359	0.0435	0.0515	0.0599	0.0688
0.0782	0.0880	0.0982	0.1089	0.1200
0.1316	0.1436	0.1561	0.1690	0.1823
0.1961	0.2104	0.2251	0.2402	0.2558
0.2719	0.2883	0.3053	0.3226	0.3405
0.3587	0.3775	0.3966	0.4166	0.4384
0.4621	0.4879	0.5155	0.5452	0.5767
0.6103	0.6458	0.6832	0.7226	0.7640
0.8073	0.8525	0.8997	0.9489	1.0000

Hrad:

0.0502	0.0963	0.1392	0.1797	0.2182
0.2551	0.2906	0.3251	0.3586	0.3913
0.4234	0.4548	0.4857	0.5162	0.5463
0.5761	0.6055	0.6346	0.6635	0.6922
0.7207	0.7490	0.7771	0.8050	0.8329
0.8606	0.8882	0.9156	0.9430	0.9703
0.9975	1.0246	1.0516	1.0289	0.9917
0.9643	0.9447	0.9312	0.9227	0.9183
0.9174	0.9193	0.9237	0.9302	0.9385
0.9484	0.9596	0.9720	0.9855	1.0000

Width:

0.0979	0.1064	0.1150	0.1236	0.1321
0.1407	0.1493	0.1579	0.1664	0.1750
0.1836	0.1921	0.2007	0.2093	0.2179
0.2264	0.2350	0.2436	0.2521	0.2607
0.2693	0.2779	0.2864	0.2950	0.3036
0.3121	0.3207	0.3293	0.3379	0.3464
0.3550	0.3636	0.3721	0.4000	0.4375
0.4750	0.5125	0.5500	0.5875	0.6250
0.6625	0.7000	0.7375	0.7750	0.8125
0.8500	0.8875	0.9250	0.9625	1.0000

**********	Volume	Volume
Flow Routing Continuity	acre-feet	10^6 gal
**********	---	---
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	1710.663	557.445
External Outflow	1640.340	534.529
Internal Outflow	0.000	0.000
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	79.306	25.843
Continuity Error (%)	-0.525	

****
Highest Flow Instability Indexes
****
Link 225_OUT (23)
Link 62 (21)
Link L982 (12)
Link 63 (11)
Link CE505 (10)

****
Routing Time Step Summary
****
Minimum Time Step : 5.00 sec

Table D.1 – Baseline Hydrology SWMM Input/Output

```
Average Time Step           :     5.00 sec
Maximum Time Step           :     5.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     1.00


******************
Node Depth Summary
******************
```

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days	hr:min
005	JUNCTION	2.08	3.62	4743.02	0	00:38
015	JUNCTION	2.53	3.09	4749.29	0	00:40
020	JUNCTION	0.00	0.00	4744.71	0	00:00
025	JUNCTION	0.00	0.00	4742.88	0	00:00
030	JUNCTION	0.00	0.00	4742.20	0	00:00
040	JUNCTION	0.00	0.00	4742.17	0	00:00
045	JUNCTION	0.00	0.00	4752.78	0	00:00
100	JUNCTION	0.25	3.41	4767.11	0	00:47
101	JUNCTION	0.05	0.86	4796.75	0	00:40
102	JUNCTION	0.05	0.86	4792.86	0	00:40
105	JUNCTION	0.16	1.84	4762.34	0	00:55
115	JUNCTION	0.07	1.71	4858.71	0	00:35
116	JUNCTION	0.06	1.71	4827.71	0	00:35
117	JUNCTION	0.09	2.51	4830.51	0	00:35
125	JUNCTION	0.00	0.00	4806.80	0	00:00
135	JUNCTION	0.11	2.26	4892.26	0	00:40
136	JUNCTION	0.47	3.40	4831.40	0	01:35
137	JUNCTION	0.14	2.81	4841.81	0	00:40
140	JUNCTION	0.25	2.19	4889.39	0	01:10
145	JUNCTION	0.15	1.36	4891.66	0	01:10
200	JUNCTION	0.00	0.00	4766.52	0	00:00
205	JUNCTION	0.01	0.24	4751.24	0	00:35
206	JUNCTION	0.03	0.56	4748.96	0	00:40
215	JUNCTION	0.00	0.00	4771.20	0	00:00
220	JUNCTION	0.00	0.00	4775.70	0	00:00
300	JUNCTION	1.52	4.37	4725.97	0	03:11
305	JUNCTION	0.03	0.78	4738.48	0	00:35
320	JUNCTION	0.01	0.26	4750.66	0	00:40
325	JUNCTION	0.08	1.66	4761.66	0	00:40
330	JUNCTION	0.00	0.00	4754.50	0	00:00
335	JUNCTION	0.00	0.00	4762.00	0	00:00
340	JUNCTION	0.00	0.00	4758.20	0	00:00
345	JUNCTION	0.00	0.00	4766.50	0	00:00
350	JUNCTION	0.04	0.87	4768.67	0	00:40
355	JUNCTION	0.11	2.20	4797.20	0	00:45
360	JUNCTION	0.16	3.23	4813.23	0	00:40
405	JUNCTION	0.00	0.00	4725.10	0	00:00
415	JUNCTION	0.00	0.00	4731.50	0	00:00
500	JUNCTION	0.00	0.00	4772.80	0	00:00
505	JUNCTION	0.15	2.62	4792.62	0	00:45
510	JUNCTION	0.00	0.00	4784.10	0	00:00
600	JUNCTION	0.00	0.00	4738.50	0	00:00
625	JUNCTION	0.00	0.00	4794.60	0	00:00
630	JUNCTION	0.10	1.42	4805.22	0	00:56
635	JUNCTION	0.10	1.42	4861.22	0	00:50
640	JUNCTION	0.02	0.43	4909.13	0	00:40
650	JUNCTION	0.00	0.00	4773.50	0	00:00
655	JUNCTION	0.57	4.79	4784.09	0	01:12
660	JUNCTION	0.14	2.01	4797.11	0	00:50
665	JUNCTION	0.03	0.39	4861.69	0	00:50
675	JUNCTION	0.00	0.00	4800.50	0	00:00
803	JUNCTION	0.00	0.00	4777.50	0	00:00
804	JUNCTION	0.28	2.71	4714.81	0	01:10
805	JUNCTION	0.34	2.77	4780.07	0	01:00
806	JUNCTION	0.00	0.00	4734.50	0	00:00
807	JUNCTION	0.27	2.72	4735.82	0	01:05
808	JUNCTION	0.00	0.00	4725.40	0	00:00
809	JUNCTION	0.00	0.00	4724.50	0	00:00
810	JUNCTION	0.00	0.00	4721.80	0	00:00
811	JUNCTION	0.37	2.84	4715.74	0	01:21
812	JUNCTION	0.35	2.85	4761.85	0	01:10
813	JUNCTION	0.00	0.00	4760.50	0	00:00
814	JUNCTION	0.00	0.00	4729.80	0	00:00
815	JUNCTION	0.36	3.00	4773.10	0	01:15
818	JUNCTION	0.38	2.98	4719.08	0	01:22
821	JUNCTION	0.00	0.00	4765.10	0	00:00
824	JUNCTION	0.00	0.00	4731.90	0	00:00
825	JUNCTION	0.00	0.00	4738.10	0	00:00
834	JUNCTION	0.00	0.00	4734.00	0	00:00
835	JUNCTION	0.00	0.00	4715.60	0	00:00
836	JUNCTION	0.00	0.00	4736.90	0	00:00
837	JUNCTION	0.00	0.00	4727.10	0	00:00
838	JUNCTION	0.00	0.00	4724.60	0	00:00
900	JUNCTION	0.33	1.97	4752.30	0	01:05
902	JUNCTION	2.24	3.46	4748.96	0	01:07
903	JUNCTION	0.38	3.30	4736.61	0	00:47
904	JUNCTION	1.18	3.77	4740.97	0	03:06
905	JUNCTION	0.39	2.85	4739.85	0	00:53
910	JUNCTION	0.57	4.79	4792.79	0	01:10
915	JUNCTION	0.93	0.95	4726.25	0	01:13
917	JUNCTION	0.57	3.71	4793.71	0	01:38
918	JUNCTION	1.00	3.85	4789.25	0	02:54
920	JUNCTION	0.43	3.47	4859.47	0	01:20
922	JUNCTION	1.05	3.84	4760.24	0	01:35
925	JUNCTION	0.47	0.58	4740.48	0	01:11
926	JUNCTION	0.05	1.06	4745.06	0	00:37
927	JUNCTION	2.26	9.39	4754.39	0	01:33
928	JUNCTION	0.48	3.50	4804.21	0	00:46
929	JUNCTION	1.56	2.31	4803.89	0	00:27
930	JUNCTION	3.00	3.21	4747.80	0	00:36
931	JUNCTION	0.76	4.46	4751.08	0	01:06
933	JUNCTION	1.86	5.26	4735.04	0	03:07
935	JUNCTION	1.52	4.37	4731.18	0	03:08
937	JUNCTION	1.83	5.29	4734.08	0	03:08
939	JUNCTION	1.66	4.93	4738.56	0	03:06
945	JUNCTION	0.20	3.21	4747.66	0	00:52
946	JUNCTION	0.21	3.51	4746.83	0	00:53
947	JUNCTION	0.19	3.51	4746.78	0	00:54
949	JUNCTION	7.21	9.37	4750.73	0	01:46
956	JUNCTION	0.06	0.50	4751.50	0	01:18
PRV	JUNCTION	0.22	2.09	4872.09	0	01:20
L137_Pond	JUNCTION	0.13	1.47	4835.47	0	01:17
970	JUNCTION	0.09	0.96	4850.96	0	01:08
972	JUNCTION	0.09	1.17	4799.37	0	01:08
974	JUNCTION	0.09	1.27	4803.27	0	00:59
130	JUNCTION	0.20	3.16	4811.16	0	00:45
977	JUNCTION	0.25	2.24	4806.24	0	01:26
120	JUNCTION	0.17	3.54	4809.54	0	00:40
981	JUNCTION	0.08	1.36	4805.36	0	01:00

Table D.1 – Baseline Hydrology SWMM Input/Output

225	JUNCTION	0.25	3.01	4827.01	0	00:55
982	JUNCTION	0.36	3.37	4789.37	0	01:38
983	JUNCTION	0.70	4.29	4791.29	0	01:24
984	JUNCTION	0.69	4.29	4792.29	0	01:22
985	JUNCTION	0.56	3.98	4783.78	0	01:27
986	JUNCTION	0.30	2.71	4785.71	0	01:19
987	JUNCTION	0.17	1.62	4751.62	0	01:11
988	JUNCTION	0.43	3.85	4782.95	0	01:33
989	JUNCTION	0.33	3.15	4783.15	0	01:22
110	JUNCTION	0.13	2.87	4792.87	0	00:40
990	JUNCTION	1.17	3.85	4774.85	0	02:53
991	JUNCTION	0.00	0.00	4738.00	0	00:00
17	JUNCTION	1.10	3.77	4745.77	0	02:59
18	JUNCTION	2.09	4.72	4772.72	0	02:53
19	JUNCTION	1.16	3.85	4784.85	0	02:55
976.2	JUNCTION	0.51	3.71	4801.71	0	01:36
136.2	JUNCTION	0.48	4.12	4824.12	0	01:31
901	JUNCTION	0.28	1.67	4748.92	0	01:06
932	JUNCTION	0.75	4.46	4751.07	0	01:06
916	JUNCTION	0.24	1.46	4746.20	0	01:07
20	JUNCTION	0.39	2.85	4737.35	0	00:54
21	JUNCTION	0.45	4.05	4774.05	0	01:33
22	JUNCTION	0.58	4.05	4776.05	0	01:33
957	JUNCTION	0.80	3.83	4749.80	0	01:37
959	JUNCTION	0.92	3.11	4746.80	0	03:02
934	JUNCTION	1.83	5.29	4733.49	0	03:08
936	JUNCTION	1.86	5.26	4734.58	0	03:07
310	JUNCTION	1.69	4.93	4735.11	0	03:07
938	JUNCTION	1.17	3.57	4737.97	0	03:06
23	JUNCTION	1.31	4.37	4745.12	0	03:02
24	JUNCTION	1.31	4.37	4743.07	0	03:04
25	JUNCTION	1.26	4.22	4741.92	0	03:05
26	JUNCTION	0.36	3.37	4788.37	0	01:39
27	JUNCTION	0.42	3.85	4781.85	0	01:33
28	JUNCTION	0.41	2.92	4737.17	0	00:54
950	JUNCTION	0.33	1.97	4754.78	0	01:05
001	JUNCTION	0.48	3.30	4737.11	0	00:47
940	JUNCTION	0.00	0.00	4768.92	0	00:00
BT001	OUTFALL	0.00	0.00	4779.20	0	00:00
BT005	OUTFALL	0.00	0.00	4773.40	0	00:00
BT010	OUTFALL	0.00	0.00	4794.50	0	00:00
BT015	OUTFALL	0.00	0.00	4738.40	0	00:00
BT020	OUTFALL	0.00	0.00	4738.00	0	00:00
BT025	OUTFALL	0.00	0.00	4731.80	0	00:00
BT030	OUTFALL	0.00	0.00	4765.00	0	00:00
BT035	OUTFALL	0.00	0.00	4721.50	0	00:00
BT040	OUTFALL	0.00	0.00	4716.00	0	00:00
BT045	OUTFALL	0.00	0.00	4729.70	0	00:00
BT046	OUTFALL	0.00	0.00	4724.50	0	00:00
BT047	OUTFALL	0.00	0.00	4727.00	0	00:00
BT055	OUTFALL	0.46	0.47	4715.97	0	02:44
BT060	OUTFALL	0.00	0.00	4712.80	0	00:00
BT065	OUTFALL	0.00	0.00	4721.70	0	00:00
BT070	OUTFALL	0.00	0.00	4724.40	0	00:00
BT075	OUTFALL	0.00	0.00	4725.30	0	00:00
BT080	OUTFALL	0.00	0.00	4712.10	0	00:00
BT085	OUTFALL	0.34	2.77	4687.57	0	01:05
LT001	OUTFALL	0.00	0.00	4752.60	0	00:00
LT005	OUTFALL	0.28	2.34	4743.34	0	01:36
LT010	OUTFALL	0.00	0.00	4740.20	0	00:00
LT015	OUTFALL	5.00	5.00	4743.33	0	00:00
LT020	OUTFALL	0.31	2.63	4731.63	0	00:49
SPR001	OUTFALL	0.00	0.00	4731.60	0	00:00
SPR005	OUTFALL	0.47	0.58	4738.48	0	04:09
SPR010	OUTFALL	0.00	0.00	4736.80	0	00:00
IRR_RETURN	OUTFALL	0.16	2.00	4743.75	0	00:28
010	DIVIDER	3.00	3.21	4749.50	0	00:36
951	DIVIDER	6.03	6.51	4749.39	0	00:35
952	DIVIDER	7.63	8.29	4750.49	0	00:40
953	DIVIDER	9.64	9.98	4752.15	0	00:35
210	DIVIDER	0.09	2.00	4760.60	0	00:31
919	DIVIDER	7.80	7.80	4748.32	0	00:00
923	DIVIDER	4.00	4.47	4761.73	0	01:21
941	DIVIDER	3.62	5.22	4767.12	0	00:45
942	DIVIDER	3.03	4.11	4769.35	0	00:43
943	DIVIDER	3.03	4.14	4771.71	0	00:40
948	DIVIDER	7.21	9.37	4753.92	0	01:45
CL_Outlet	DIVIDER	11.20	11.20	4742.90	0	00:00
944	DIVIDER	10.00	10.00	4767.24	0	00:00
976	DIVIDER	0.88	4.10	4805.89	0	01:38
978	DIVIDER	0.66	3.50	4805.21	0	00:44
225_SPLIT	DIVIDER	0.00	0.00	4792.40	0	00:00
115_Pond	STORAGE	0.66	5.47	4855.47	0	01:08
116_POND	STORAGE	0.41	5.25	4803.45	0	01:08
117_POND	STORAGE	0.39	5.15	4807.15	0	00:59
120_POND	STORAGE	0.15	2.80	4806.80	0	01:00
130_POND	STORAGE	0.41	3.22	4807.22	0	01:26
137_Pond	STORAGE	0.50	5.76	4839.76	0	01:17
225_POND	STORAGE	0.37	3.99	4798.99	0	01:38
335_POND	STORAGE	0.63	6.65	4756.65	0	01:11
355_POND	STORAGE	0.86	5.22	4793.22	0	01:22
360_POND	STORAGE	0.61	4.62	4787.62	0	01:19
Centennial	STORAGE	4.06	4.74	4729.74	0	02:27
CF	STORAGE	3.20	5.51	4765.51	0	01:21
Ehrlich	STORAGE	6.07	11.16	4751.16	0	03:02
PH	STORAGE	2.95	14.50	4797.50	0	02:54
PlatteRiverVillagePond	STORAGE	0.70	6.38	4876.38	0	01:20
SV_S	STORAGE	1.10	1.61	4732.61	0	02:08
505_POND	STORAGE	0.44	3.75	4783.75	0	01:22
110_POND	STORAGE	0.43	4.04	4780.04	0	01:15
325_POND	STORAGE	0.43	4.36	4755.36	0	01:18
836_POND	STORAGE	0.45	3.49	4741.49	0	01:10
LolaParkPond	STORAGE	0.73	4.88	4758.88	0	01:49

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal
005	JUNCTION	125.51	188.29	0 00:38	1.846	3.155
015	JUNCTION	23.80	23.80	0 00:40	0.490	0.490
020	JUNCTION	104.71	104.71	0 00:40	2.075	2.075
025	JUNCTION	29.32	29.32	0 00:35	0.414	0.414
030	JUNCTION	42.26	42.26	0 00:40	0.834	0.834
040	JUNCTION	13.83	13.83	0 00:35	0.267	0.267
045	JUNCTION	36.28	36.28	0 00:45	0.931	0.931
100	JUNCTION	199.60	231.52	0 00:47	4.431	6.124
101	JUNCTION	31.34	31.34	0 00:40	0.752	0.752

Table D.1 – Baseline Hydrology SWMM Input/Output

102	JUNCTION	34.76	65.85	0	00:40	0.877	1.629
105	JUNCTION	84.29	84.29	0	00:55	3.066	3.066
115	JUNCTION	138.23	138.23	0	00:35	2.171	2.171
116	JUNCTION	276.26	276.26	0	00:35	4.475	4.475
117	JUNCTION	308.65	308.65	0	00:35	4.296	4.296
125	JUNCTION	360.40	360.40	0	01:15	20.286	20.286
135	JUNCTION	664.74	664.74	0	00:40	14.550	14.550
136	JUNCTION	362.81	1688.95	0	01:31	14.109	82.790
137	JUNCTION	689.17	689.17	0	00:40	15.660	15.660
140	JUNCTION	465.15	465.15	0	01:10	21.154	21.154
145	JUNCTION	321.06	321.06	0	01:10	16.120	16.120
200	JUNCTION	41.77	41.77	0	00:45	1.169	1.169
205	JUNCTION	15.40	15.40	0	00:35	0.258	0.258
206	JUNCTION	10.92	10.92	0	00:40	0.257	0.257
215	JUNCTION	59.15	59.15	0	00:50	1.804	1.804
220	JUNCTION	100.07	100.07	0	00:40	2.110	2.110
300	JUNCTION	39.51	1290.79	0	03:11	2.054	177.495
305	JUNCTION	70.23	70.23	0	00:35	1.084	1.084
320	JUNCTION	76.03	76.03	0	00:40	1.778	1.778
325	JUNCTION	441.14	441.14	0	00:40	8.685	8.685
330	JUNCTION	389.31	389.31	0	00:35	4.942	4.942
335	JUNCTION	775.43	775.43	0	00:40	13.060	13.060
340	JUNCTION	20.75	20.75	0	00:50	0.701	0.701
345	JUNCTION	109.56	109.56	0	00:40	2.012	2.012
350	JUNCTION	95.62	95.62	0	00:40	1.903	1.903
355	JUNCTION	712.33	712.33	0	00:45	15.018	15.018
360	JUNCTION	388.70	388.70	0	00:40	8.548	8.548
405	JUNCTION	695.99	695.99	0	00:35	10.812	10.812
415	JUNCTION	336.37	336.37	0	00:35	4.514	4.514
500	JUNCTION	42.53	42.53	0	00:40	0.894	0.894
505	JUNCTION	197.99	197.99	0	00:45	4.666	4.666
510	JUNCTION	59.15	59.15	0	01:00	2.586	2.586
600	JUNCTION	207.65	207.65	0	00:50	6.639	6.639
625	JUNCTION	156.23	798.66	0	00:51	4.822	24.235
630	JUNCTION	258.51	644.11	0	00:51	5.031	19.413
635	JUNCTION	395.70	395.70	0	00:50	13.163	13.163
640	JUNCTION	56.32	56.32	0	00:40	1.141	1.141
650	JUNCTION	100.96	100.96	0	00:40	2.144	2.144
655	JUNCTION	58.54	1112.39	0	01:11	1.518	53.011
660	JUNCTION	135.63	283.58	0	00:50	3.160	8.568
665	JUNCTION	162.91	162.91	0	00:50	5.399	5.399
675	JUNCTION	857.42	857.42	0	01:15	42.919	42.919
803	JUNCTION	157.56	157.56	0	01:10	8.587	8.587
804	JUNCTION	426.68	430.32	0	00:35	5.837	18.640
805	JUNCTION	195.84	340.90	0	01:00	7.179	15.766
806	JUNCTION	159.69	159.69	0	01:00	6.656	6.656
807	JUNCTION	139.53	297.68	0	01:05	6.072	12.728
808	JUNCTION	370.71	370.71	0	01:05	15.181	15.181
809	JUNCTION	536.72	536.72	0	01:10	24.623	24.623
810	JUNCTION	605.20	605.20	0	01:20	32.476	32.476
811	JUNCTION	195.20	606.07	0	01:13	5.452	30.220
812	JUNCTION	134.19	474.63	0	01:10	5.900	24.678
813	JUNCTION	348.77	348.77	0	01:15	18.777	18.777
814	JUNCTION	225.13	225.13	0	00:45	5.824	5.824
815	JUNCTION	480.26	480.26	0	01:15	24.537	24.537
818	JUNCTION	420.78	890.26	0	01:20	22.709	47.353
821	JUNCTION	219.18	219.18	0	00:50	6.774	6.774
824	JUNCTION	198.21	198.21	0	01:05	8.499	8.499
825	JUNCTION	161.21	161.21	0	00:50	5.415	5.415
834	JUNCTION	122.51	122.51	0	00:45	3.005	3.005
835	JUNCTION	417.22	417.22	0	00:35	5.327	5.327
836	JUNCTION	212.05	212.05	0	00:35	3.288	3.288
837	JUNCTION	85.58	85.58	0	00:30	1.147	1.147
838	JUNCTION	171.71	171.71	0	00:30	1.899	1.899
900	JUNCTION	0.00	119.17	0	01:05	0.000	10.127
902	JUNCTION	0.00	119.15	0	01:07	0.000	10.127
903	JUNCTION	0.00	406.73	0	00:47	0.000	18.359
904	JUNCTION	0.00	1281.33	0	03:06	0.000	171.188
905	JUNCTION	0.00	183.42	0	00:53	0.000	12.202
910	JUNCTION	0.00	1073.34	0	01:10	0.000	51.487
915	JUNCTION	0.00	6.00	0	01:13	0.000	3.782
917	JUNCTION	0.00	2360.00	0	01:35	0.000	122.861
918	JUNCTION	0.00	874.51	0	02:54	0.000	122.847
920	JUNCTION	0.00	1120.34	0	01:20	0.000	52.356
922	JUNCTION	0.00	537.39	0	01:35	0.000	28.416
925	JUNCTION	0.00	6.00	0	01:11	0.000	2.623
926	JUNCTION	0.00	46.46	0	00:36	0.000	0.844
927	JUNCTION	0.00	726.27	0	01:33	0.000	41.477
928	JUNCTION	0.00	158.86	0	01:01	0.000	6.967
929	JUNCTION	0.00	12.88	0	00:27	0.000	2.613
930	JUNCTION	0.00	31.41	0	00:36	0.000	0.586
931	JUNCTION	0.00	119.16	0	01:06	0.000	10.127
933	JUNCTION	0.00	1281.31	0	03:07	0.000	174.403
935	JUNCTION	0.00	1281.27	0	03:08	0.000	174.376
937	JUNCTION	0.00	1281.28	0	03:08	0.000	174.389
939	JUNCTION	0.00	1281.33	0	03:06	0.000	171.180
945	JUNCTION	0.00	230.63	0	00:52	0.000	6.106
946	JUNCTION	0.00	230.51	0	00:53	0.000	6.107
947	JUNCTION	0.00	230.50	0	00:54	0.000	6.107
949	JUNCTION	0.00	705.33	0	01:46	0.000	41.582
956	JUNCTION	0.00	169.89	0	01:18	0.000	8.684
PRV	JUNCTION	0.00	357.18	0	01:20	0.000	14.736
L137_Pond	JUNCTION	0.00	390.42	0	01:17	0.000	15.718
970	JUNCTION	0.00	56.54	0	01:08	0.000	2.179
972	JUNCTION	0.00	117.54	0	01:08	0.000	4.489
974	JUNCTION	0.00	136.72	0	00:59	0.000	4.308
130	JUNCTION	153.82	153.82	0	00:45	4.095	4.095
977	JUNCTION	0.00	91.19	0	01:26	0.000	4.125
120	JUNCTION	229.49	229.49	0	00:40	4.346	4.346
981	JUNCTION	0.00	146.95	0	01:00	0.000	4.348
225	JUNCTION	263.75	263.75	0	00:55	9.249	9.249
982	JUNCTION	0.00	169.02	0	01:38	0.000	9.306
983	JUNCTION	0.00	274.44	0	01:24	0.000	15.018
984	JUNCTION	0.00	274.72	0	01:22	0.000	15.017
985	JUNCTION	0.00	485.81	0	01:27	0.000	23.699
986	JUNCTION	0.00	222.13	0	01:19	0.000	8.667
987	JUNCTION	0.00	279.19	0	01:11	0.000	13.058
988	JUNCTION	0.00	256.21	0	01:33	0.000	13.973
989	JUNCTION	0.00	92.61	0	01:22	0.000	4.669
110	JUNCTION	271.49	271.49	0	00:40	4.956	4.956
990	JUNCTION	0.00	904.70	0	02:53	0.000	127.835
991	JUNCTION	0.00	52.02	0	01:10	0.000	3.287
17	JUNCTION	0.00	904.54	0	02:59	0.000	127.874
18	JUNCTION	0.00	904.70	0	02:53	0.000	127.834
19	JUNCTION	0.00	874.51	0	02:55	0.000	122.847
976.2	JUNCTION	0.00	2058.61	0	01:36	0.000	104.882
136.2	JUNCTION	0.00	1688.95	0	01:31	0.000	82.790
901	JUNCTION	0.00	119.16	0	01:06	0.000	10.127
932	JUNCTION	0.00	119.15	0	01:06	0.000	10.127
916	JUNCTION	0.00	183.42	0	00:53	0.000	12.202
20	JUNCTION	0.00	183.41	0	00:54	0.000	12.198
21	JUNCTION	0.00	482.22	0	01:33	0.000	23.762
22	JUNCTION	0.00	482.23	0	01:33	0.000	23.761
957	JUNCTION	0.00	726.28	0	01:33	0.000	41.477

Table D.1 – Baseline Hydrology SWMM Input/Output

959	JUNCTION	0.00	1281.59	0	03:02	0.000	171.256
934	JUNCTION	0.00	1281.27	0	03:08	0.000	174.378
936	JUNCTION	0.00	1281.29	0	03:07	0.000	174.391
310	JUNCTION	210.03	1281.31	0	03:07	3.230	174.405
938	JUNCTION	0.00	1281.33	0	03:06	0.000	171.182
23	JUNCTION	0.00	1281.59	0	03:02	0.000	171.235
24	JUNCTION	0.00	1281.37	0	03:04	0.000	171.210
25	JUNCTION	0.00	1281.35	0	03:05	0.000	171.197
26	JUNCTION	0.00	169.02	0	01:39	0.000	9.304
27	JUNCTION	0.00	256.21	0	01:33	0.000	13.971
28	JUNCTION	0.00	183.41	0	00:54	0.000	12.196
950	JUNCTION	0.00	119.18	0	01:05	0.000	10.129
001	JUNCTION	116.25	406.73	0	00:47	1.547	18.360
940	JUNCTION	0.00	0.00	0	00:00	0.000	0.000
BT001	OUTFALL	0.00	1112.39	0	01:11	0.000	53.011
BT005	OUTFALL	0.00	100.96	0	00:40	0.000	2.144
BT010	OUTFALL	0.00	798.66	0	00:51	0.000	24.235
BT015	OUTFALL	0.00	207.65	0	00:50	0.000	6.639
BT020	OUTFALL	0.00	161.21	0	00:50	0.000	5.415
BT025	OUTFALL	0.00	198.21	0	01:05	0.000	8.499
BT030	OUTFALL	0.00	219.18	0	00:50	0.000	6.774
BT035	OUTFALL	0.00	1290.79	0	03:11	0.000	177.495
BT040	OUTFALL	0.00	890.26	0	01:20	0.000	47.353
BT045	OUTFALL	0.00	225.13	0	00:45	0.000	5.824
BT046	OUTFALL	0.00	171.71	0	00:30	0.000	1.899
BT047	OUTFALL	0.00	85.58	0	00:30	0.000	1.147
BT055	OUTFALL	0.00	417.26	0	00:35	0.000	9.086
BT060	OUTFALL	0.00	606.07	0	01:13	0.000	30.220
BT065	OUTFALL	0.00	605.20	0	01:20	0.000	32.476
BT070	OUTFALL	0.00	536.72	0	01:10	0.000	24.623
BT075	OUTFALL	0.00	370.71	0	01:05	0.000	15.181
BT080	OUTFALL	0.00	430.32	0	00:35	0.000	18.640
BT085	OUTFALL	0.00	340.30	0	01:05	0.000	15.771
LT001	OUTFALL	0.00	59.15	0	01:00	0.000	2.586
LT005	OUTFALL	0.00	256.08	0	01:36	0.000	13.974
LT010	OUTFALL	0.00	42.53	0	00:40	0.000	0.894
LT015	OUTFALL	0.00	230.50	0	00:54	0.000	6.105
LT020	OUTFALL	0.00	406.50	0	00:49	0.000	18.363
SPR001	OUTFALL	0.00	0.00	0	00:00	0.000	0.000
SPR005	OUTFALL	0.00	6.00	0	04:09	0.000	2.622
SPR010	OUTFALL	0.00	52.02	0	01:10	0.000	3.287
IRR_RETURN	OUTFALL	0.00	5.23	0	01:26	0.000	0.227
010	DIVIDER	23.58	31.41	0	00:36	0.328	0.586
951	DIVIDER	0.00	29.32	0	00:35	0.000	0.414
952	DIVIDER	0.00	48.71	0	00:40	0.000	1.041
953	DIVIDER	0.00	15.51	0	00:35	0.000	0.372
210	DIVIDER	42.99	42.99	0	00:40	0.894	0.894
919	DIVIDER	0.00	230.50	0	00:54	0.000	6.107
923	DIVIDER	0.00	78.55	0	01:21	0.000	4.613
941	DIVIDER	0.00	156.04	0	00:45	0.000	3.923
942	DIVIDER	0.00	97.68	0	00:43	0.000	2.121
943	DIVIDER	0.00	100.07	0	00:40	0.000	2.110
948	DIVIDER	0.00	705.41	0	01:45	0.000	41.573
CL_Outlet	DIVIDER	0.00	6.00	0	00:39	0.000	3.788
944	DIVIDER	0.00	230.65	0	00:51	0.000	6.105
976	DIVIDER	0.00	2070.52	0	01:36	0.000	107.494
978	DIVIDER	0.00	158.86	0	01:00	0.000	6.962
225_SPLIT	DIVIDER	0.00	0.00	0	00:00	0.000	0.000
115_Pond	STORAGE	0.00	129.57	0	00:41	0.000	2.179
116_POND	STORAGE	0.00	269.03	0	00:41	0.000	4.491
117_POND	STORAGE	0.00	290.09	0	00:39	0.000	4.310
120_POND	STORAGE	0.00	229.41	0	00:40	0.000	4.349
130_POND	STORAGE	0.00	147.01	0	00:53	0.000	4.125
137_Pond	STORAGE	0.00	676.02	0	00:47	0.000	15.723
225_POND	STORAGE	0.00	257.31	0	01:01	0.000	9.307
335_POND	STORAGE	0.00	775.43	0	00:40	0.000	13.060
355_POND	STORAGE	0.00	711.68	0	00:45	0.000	15.018
360_POND	STORAGE	0.00	359.17	0	00:51	0.000	8.669
Centennial	STORAGE	0.00	808.44	0	00:40	0.000	13.817
CF	STORAGE	0.00	197.64	0	00:41	0.000	3.918
Ehrlich	STORAGE	0.00	1605.43	0	01:55	0.000	184.859
PH	STORAGE	0.00	2360.00	0	01:35	0.000	122.861
PlatteRiverVillagePond	STORAGE	0.00	625.22	0	00:50	0.000	14.739
SV_S	STORAGE	0.00	336.37	0	00:35	0.000	4.514
505_POND	STORAGE	0.00	198.07	0	00:46	0.000	4.669
110_POND	STORAGE	0.00	267.09	0	00:41	0.000	4.960
325_POND	STORAGE	0.00	440.45	0	00:40	0.000	8.685
836_POND	STORAGE	0.00	212.05	0	00:35	0.000	3.288
LolaParkPond	STORAGE	0.00	312.94	0	00:53	0.000	9.199

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Node Surcharge Summary
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Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
020	JUNCTION	24.00	0.000	0.000
025	JUNCTION	24.00	0.000	0.000
030	JUNCTION	24.00	0.000	0.000
040	JUNCTION	24.00	0.000	0.000
045	JUNCTION	24.00	0.000	0.000
125	JUNCTION	24.00	0.000	0.000
200	JUNCTION	24.00	0.000	0.000
215	JUNCTION	24.00	0.000	0.000
220	JUNCTION	24.00	0.000	0.000
330	JUNCTION	24.00	0.000	0.000
335	JUNCTION	24.00	0.000	0.000
340	JUNCTION	24.00	0.000	0.000
345	JUNCTION	24.00	0.000	0.000
405	JUNCTION	24.00	0.000	0.000
415	JUNCTION	24.00	0.000	0.000
500	JUNCTION	24.00	0.000	0.000
510	JUNCTION	24.00	0.000	0.000
600	JUNCTION	24.00	0.000	0.000
625	JUNCTION	24.00	0.000	0.000
650	JUNCTION	24.00	0.000	0.000
675	JUNCTION	24.00	0.000	0.000
803	JUNCTION	24.00	0.000	0.000
806	JUNCTION	24.00	0.000	0.000
808	JUNCTION	24.00	0.000	0.000
809	JUNCTION	24.00	0.000	0.000
810	JUNCTION	24.00	0.000	0.000
813	JUNCTION	24.00	0.000	0.000
814	JUNCTION	24.00	0.000	0.000
821	JUNCTION	24.00	0.000	0.000
824	JUNCTION	24.00	0.000	0.000
825	JUNCTION	24.00	0.000	0.000
834	JUNCTION	24.00	0.000	0.000
835	JUNCTION	24.00	0.000	0.000

Table D.1 – Baseline Hydrology SWMM Input/Output

836	JUNCTION	24.00	0.000	0.000
837	JUNCTION	24.00	0.000	0.000
838	JUNCTION	24.00	0.000	0.000
991	JUNCTION	24.00	0.000	0.000
210	DIVIDER	0.49	0.000	0.000
335_POND	STORAGE	24.00	6.653	3.347
355_POND	STORAGE	0.63	0.223	2.777
Centennial	STORAGE	24.00	4.743	7.257
CF	STORAGE	4.12	0.508	0.012
Ehrlich	STORAGE	6.24	4.160	1.840
PH	STORAGE	24.00	14.498	0.502
SV_S	STORAGE	24.00	1.615	5.385
836_POND	STORAGE	24.00	3.489	6.511

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Node Flooding Summary
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No nodes were flooded.

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Storage Volume Summary
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Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
115_Pond	11.693	5	0	149.506	61	0 01:08	56.54
116_POND	15.379	3	0	275.684	56	0 01:08	117.54
117_POND	14.245	3	0	265.538	54	0 00:59	136.72
120_POND	6.934	1	0	170.691	16	0 01:00	146.95
130_POND	20.608	4	0	226.218	42	0 01:26	91.19
137_Pond	42.490	2	0	723.287	33	0 01:17	390.42
225_POND	25.153	5	0	346.035	64	0 01:38	169.02
335_POND	66.790	3	0	963.900	44	0 01:11	279.19
355_POND	127.009	5	0	1188.326	43	0 01:22	274.72
360_POND	38.515	7	0	463.974	85	0 01:19	222.13
Centennial	1530.455	30	0	1801.560	35	0 02:27	6.00
CF	202.869	48	0	423.865	100	0 01:21	63.58
Ehrlich	2620.474	32	0	5537.741	67	0 03:02	1281.59
PH	1374.840	17	0	7755.713	96	0 02:54	874.51
PlatteRiverVillagePond	72.068	3	0	887.602	41	0 01:20	357.18
SV_S	385.980	15	0	570.680	22	0 02:08	6.00
505_POND	25.923	5	0	306.549	56	0 01:22	92.61
110_POND	27.405	5	0	356.014	65	0 01:15	108.60
325_POND	45.221	6	0	620.801	76	0 01:17	169.89
836_POND	25.051	1	0	265.193	12	0 01:10	52.02
LolaParkPond	64.237	6	0	639.989	56	0 01:49	99.56

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Outfall Loading Summary
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Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
BT001	44.42	184.63	1112.39	53.011
BT005	13.11	25.29	100.96	2.144
BT010	39.25	95.55	798.66	24.235
BT015	18.01	57.04	207.65	6.639
BT020	19.09	43.89	161.21	5.415
BT025	23.55	55.85	198.21	8.499
BT030	18.14	57.79	219.18	6.774
BT035	99.20	276.86	1290.79	177.495
BT040	83.97	87.25	890.26	47.353
BT045	15.54	57.99	225.13	5.824
BT046	9.02	32.57	171.71	1.899
BT047	9.37	18.95	85.58	1.147
BT055	99.65	14.11	417.26	9.086
BT060	73.55	63.57	606.07	30.220
BT065	29.50	170.33	605.20	32.476
BT070	25.69	148.31	536.72	24.623
BT075	23.00	102.14	370.71	15.181
BT080	72.45	39.81	430.32	18.640
BT085	39.59	61.63	340.30	15.771
LT001	23.26	17.20	59.15	2.586
LT005	51.96	41.61	256.08	13.974
LT010	13.13	10.53	42.53	0.894
LT015	38.50	24.54	230.50	6.105
LT020	99.13	28.66	406.50	18.363
SPR001	0.00	0.00	0.00	0.000
SPR005	99.10	4.09	6.00	2.622
SPR010	23.70	21.46	52.02	3.287
IRR_RETURN	21.94	1.60	5.23	0.227
System	40.24	1743.26	7477.94	534.490

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Link Flow Summary
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Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
CE001	CONDUIT	406.73	0 00:47	10.84	0.89	0.73
CE405	DUMMY	695.99	0 00:35			
CE415	DUMMY	336.37	0 00:35			
CE500	DUMMY	42.53	0 00:40			
CE505	CONDUIT	256.08	0 01:36	7.63	0.17	0.47
CE510	DUMMY	59.15	0 01:00			
CE600	DUMMY	207.65	0 00:50			
CE625	DUMMY	798.66	0 00:51			
CE630	DUMMY	644.11	0 00:51			
CE635	CONDUIT	394.48	0 00:56	6.36	0.08	0.28
CE640	CONDUIT	51.65	0 00:49	3.82	0.01	0.08
CE650	DUMMY	100.96	0 00:40			
CE655	DUMMY	1112.39	0 01:11			
CE660	CONDUIT	283.54	0 00:51	7.04	0.14	0.40
CE665	CONDUIT	162.59	0 00:55	12.32	0.01	0.08
CE675	DUMMY	857.42	0 01:15			
CE803	DUMMY	157.56	0 01:10			
CE804	DUMMY	430.32	0 00:35			
CE805	CONDUIT	340.30	0 01:05	9.41	0.23	0.55
CE806	DUMMY	159.69	0 01:00			

Table D.1 – Baseline Hydrology SWMM Input/Output

CE807	CONDUIT	295.06	0	01:10	4.70	0.26	0.54
CE808	DUMMY	370.71	0	01:05			
CE809	DUMMY	536.72	0	01:10			
CE810	DUMMY	605.20	0	01:20			
CE811	DUMMY	606.07	0	01:13			
CE813	DUMMY	348.77	0	01:15			
CE814	DUMMY	225.13	0	00:45			
CE815	CONDUIT	475.75	0	01:22	6.53	0.32	0.60
CE818	DUMMY	890.26	0	01:20			
CE821	DUMMY	219.18	0	00:50			
CE824	DUMMY	198.21	0	01:05			
CE825	DUMMY	161.21	0	00:50			
CE834	DUMMY	122.51	0	00:45			
CE835	DUMMY	417.22	0	00:35			
CE837	DUMMY	85.58	0	00:30			
CE838	DUMMY	171.71	0	00:30			
CE910	CONDUIT	1071.74	0	01:12	6.62	0.90	0.96
CE911	CONDUIT	471.97	0	01:21	6.23	0.28	0.57
CE915	CONDUIT	6.00	0	02:44	1.85	0.01	0.09
CL_Out	CONDUIT	6.00	0	01:13	5.11	0.72	0.63
CL_Spill	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
D020	DUMMY	104.71	0	00:40			
D025	DUMMY	29.32	0	00:35			
D030	DUMMY	42.26	0	00:40			
D040	DUMMY	13.83	0	00:35			
D200	DUMMY	41.77	0	00:45			
D215	DUMMY	59.15	0	00:50			
D220	DUMMY	100.07	0	00:40			
D330	DUMMY	389.31	0	00:35			
L335	DUMMY	775.43	0	00:40			
D340	DUMMY	20.75	0	00:50			
D345	DUMMY	109.56	0	00:40			
LOLA_SPILL	CONDUIT	904.54	0	02:59	6.97	0.55	0.74
E300	DUMMY	1290.79	0	03:11			
E305	CONDUIT	69.28	0	00:36	4.35	0.01	0.16
E310	CONDUIT	1281.31	0	03:07	11.40	0.96	0.80
E320	CONDUIT	75.94	0	00:40	6.51	0.00	0.06
E350	CONDUIT	92.98	0	00:43	4.06	0.01	0.17
E355	CONDUIT	272.54	0	01:30	3.75	0.06	0.30
E360	CONDUIT	482.23	0	01:33	4.15	0.11	0.40
E904	CONDUIT	1281.33	0	03:06	12.91	0.09	0.36
E922	CONDUIT	533.85	0	01:37	4.84	0.10	0.38
E923	CONDUIT	48.71	0	01:35	4.81	1.12	1.00
E923_OF	CONDUIT	24.07	0	01:25	3.09	0.13	0.38
E927	CONDUIT	705.41	0	01:45	1.86	0.83	0.93
E933	CONDUIT	1281.29	0	03:07	6.72	0.22	0.53
E934	CONDUIT	1281.27	0	03:08	16.00	0.82	0.72
E935	CONDUIT	1280.95	0	03:11	9.21	0.14	0.44
E936	CONDUIT	1281.28	0	03:08	11.65	0.94	0.79
E937	CONDUIT	1281.27	0	03:08	7.78	0.23	0.53
E938	CONDUIT	1281.33	0	03:06	14.17	0.97	0.81
E939	CONDUIT	1281.31	0	03:07	7.50	0.19	0.49
E948	CONDUIT	124.13	0	04:24	10.75	1.08	1.00
E948_OF	CONDUIT	590.58	0	01:46	4.34	0.15	0.47
E956	CONDUIT	169.86	0	01:19	4.85	0.00	0.10
E957	CONDUIT	726.27	0	01:33	13.41	0.75	0.68
E959	CONDUIT	1281.59	0	03:02	15.27	0.95	0.78
Eh_In	DUMMY	705.33	0	01:46			
L010	CONDUIT	12.69	0	01:09	7.79	1.08	1.00
L010_OF	CONDUIT	19.68	0	00:36	3.00	0.04	0.21
L015	CONDUIT	23.10	0	00:44	2.42	0.00	0.12
L019	CONDUIT	185.25	0	00:42	3.19	0.05	0.32
L045_OF	DUMMY	36.28	0	00:45			
L100	CONDUIT	230.03	0	00:52	4.38	0.38	0.68
L105	CONDUIT	84.16	0	00:55	4.90	0.08	0.37
L917	DUMMY	2360.00	0	01:35			
980	CONDUIT	124.24	0	01:25	13.92	1.07	1.00
980_OF	CONDUIT	43.24	0	01:01	3.82	0.08	0.32
L125	DUMMY	360.40	0	01:15			
L976	CONDUIT	12.88	0	00:27	4.42	1.08	1.00
CR21cROSSING	CONDUIT	2058.61	0	01:36	26.58	0.35	0.39
L135	CONDUIT	625.22	0	00:50	4.82	0.06	0.22
L140	CONDUIT	460.16	0	01:16	4.43	0.12	0.43
L145	CONDUIT	312.65	0	01:24	3.76	0.08	0.27
L205	CONDUIT	15.31	0	00:35	4.42	0.01	0.12
L206	CONDUIT	10.75	0	00:43	1.46	0.02	0.19
L900	CHANNEL	119.16	0	01:06	4.26	0.07	0.28
L901	CONDUIT	119.16	0	01:06	8.51	0.38	0.44
L902	CONDUIT	119.15	0	01:07	4.73	0.01	0.15
L903	CONDUIT	406.50	0	00:49	5.06	0.28	0.53
L905	CONDUIT	180.24	0	01:08	1.43	0.36	0.58
L916	CONDUIT	183.42	0	00:53	21.52	0.20	0.33
L918	CONDUIT	874.39	0	03:00	4.17	0.29	0.62
L920	CONDUIT	1064.94	0	01:35	4.65	0.40	0.67
L926	CONDUIT	42.53	0	00:46	2.22	0.01	0.18
L928	CONDUIT	158.76	0	01:02	4.22	0.05	0.28
L929	CONDUIT	12.13	0	07:07	1.35	0.04	0.26
L930	CONDUIT	31.38	0	00:37	1.91	0.23	0.53
L931	CONDUIT	119.15	0	01:06	0.96	0.03	0.22
L932	CONDUIT	119.15	0	01:07	9.52	0.38	0.42
L950	CONDUIT	119.17	0	01:05	8.89	0.40	0.44
L951	CONDUIT	6.99	0	00:25	2.58	1.08	1.00
L951_OF	CONDUIT	21.33	0	00:38	4.60	0.00	0.09
L952	CONDUIT	1.82	0	02:18	0.74	1.08	1.00
L952_OF	CONDUIT	46.06	0	00:43	3.71	0.01	0.14
L953	CONDUIT	5.23	0	01:26	1.92	1.08	1.00
L953_OF	CONDUIT	9.84	0	00:45	4.31	0.00	0.07
Q210	CONDUIT	30.96	0	00:58	10.70	1.07	1.00
Q210_OF	CONDUIT	14.04	0	00:40	3.29	0.03	0.21
Q225	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
Q225_OF	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
Q919	CONDUIT	230.50	0	00:54	13.93	0.72	0.63
Q919_OF	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
Q940	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
Q941	CONDUIT	144.69	0	00:59	8.08	1.08	0.96
Q941_OF	CONDUIT	19.28	0	00:58	5.04	0.05	0.26
Q942	CONDUIT	97.63	0	00:44	10.40	0.84	0.70
Q942_OF	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
Q943	CONDUIT	49.91	0	00:30	7.80	1.08	1.00
Q943_OF	CONDUIT	51.49	0	00:43	3.28	0.53	0.74
Q944	CONDUIT	230.63	0	00:52	16.41	0.78	0.64
Q945	CONDUIT	230.51	0	00:53	3.17	0.38	0.64
Q946	CONDUIT	230.50	0	00:54	3.28	0.62	0.58
Q947	CONDUIT	230.50	0	00:54	10.04	0.08	0.29
SPR836	DUMMY	52.02	0	01:10			
SPR925	CONDUIT	6.00	0	04:09	6.24	0.08	0.19
944_OF	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
L137	CONDUIT	676.02	0	00:47	3.85	0.09	0.28
L136	CONDUIT	1676.93	0	01:38	5.89	0.18	0.41
L115	CONDUIT	129.57	0	00:41	3.05	0.01	0.16
L116	CONDUIT	269.03	0	00:41	5.75	0.03	0.17
L117	CONDUIT	290.09	0	00:39	6.25	0.04	0.24
L988	CONDUIT	31.27	0	00:40	9.80	0.17	0.43
48	CONDUIT	57.94	0	00:59	3.48	0.19	0.42

Table D.1 – Baseline Hydrology SWMM Input/Output

CR42_CROSSING	CONDUIT	357.18	0	01:20	45.92	0.36	0.42
921	CONDUIT	390.42	0	01:17	16.75	0.08	0.29
971	CONDUIT	54.76	0	01:19	4.16	0.03	0.19
973	CONDUIT	117.54	0	01:08	6.87	0.05	0.23
975	CONDUIT	136.70	0	00:59	7.12	0.06	0.25
L130	CONDUIT	147.01	0	00:53	2.79	0.32	0.62
978	CONDUIT	91.19	0	01:26	12.57	0.60	0.56
L120	CONDUIT	229.41	0	00:40	3.42	0.44	0.71
982	CONDUIT	146.95	0	01:00	10.31	0.05	0.27
L225	CONDUIT	257.31	0	01:01	5.18	0.30	0.60
L982	CONDUIT	169.00	0	01:40	7.71	0.04	0.23
L355	CONDUIT	711.68	0	00:45	23.55	0.15	0.44
L984	CONDUIT	274.44	0	01:24	2.89	0.69	0.86
L360	CONDUIT	359.17	0	00:51	5.33	0.36	0.62
L986	CONDUIT	222.11	0	01:20	5.18	0.24	0.54
L987	CONDUIT	279.18	0	01:11	15.04	0.08	0.32
L505	CONDUIT	198.07	0	00:46	4.93	0.22	0.52
51	CONDUIT	92.61	0	01:22	8.73	0.96	0.79
L110	CONDUIT	267.09	0	00:41	5.76	0.27	0.57
L325	CONDUIT	440.45	0	00:40	22.80	0.08	0.33
52	DUMMY	212.05	0	00:35			
53	CONDUIT	874.51	0	02:55	20.67	0.92	0.77
54	CONDUIT	904.70	0	02:53	23.50	0.92	0.77
55	CONDUIT	904.54	0	02:59	20.00	0.56	0.54
L130_OF	CONDUIT	2058.06	0	01:38	6.60	0.47	0.74
CR44	CONDUIT	1688.95	0	01:31	43.37	0.79	0.70
56	CONDUIT	183.41	0	00:54	9.57	0.86	0.71
57	CONDUIT	482.22	0	01:33	14.88	0.97	0.81
58	CONDUIT	481.98	0	01:35	7.18	0.28	0.56
59	CONDUIT	1281.37	0	03:04	4.69	0.78	0.87
60	CONDUIT	1281.35	0	03:05	5.33	0.73	0.84
61	CONDUIT	1281.33	0	03:06	6.94	0.87	0.75
62	CONDUIT	169.02	0	01:39	12.02	0.79	0.67
63	CONDUIT	256.21	0	01:33	15.80	0.94	0.77
64	CONDUIT	183.41	0	00:54	4.44	0.99	0.81
Centennial_Out	DUMMY	6.00	0	00:39			
CF_OUT	DUMMY	63.58	0	01:21			
EL_OUT	DUMMY	1281.59	0	03:02			
SV_S_Outlet	DUMMY	6.00	0	01:11			
PRV_OUT	DUMMY	357.18	0	01:20			
137_Out	DUMMY	390.42	0	01:17			
115_Out	DUMMY	56.54	0	01:08			
116_OUT	DUMMY	117.54	0	01:08			
117_OUT	DUMMY	136.72	0	00:59			
130_OUT	DUMMY	91.19	0	01:26			
120_OUT	DUMMY	146.95	0	01:00			
225_OUT	DUMMY	169.02	0	01:38			
355_OUT	DUMMY	274.72	0	01:22			
360_OUT	DUMMY	222.13	0	01:19			
335_OUT	DUMMY	279.19	0	01:11			
505_OUT	DUMMY	92.61	0	01:22			
110_OUT	DUMMY	108.60	0	01:15			
325_OUT	DUMMY	169.89	0	01:18			
836_OUT	DUMMY	52.02	0	01:10			
PH_Weir	DUMMY	874.51	0	02:54			
1	DUMMY	99.56	0	01:49			

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Conduit Surcharge Summary
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Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
CE001	0.01	0.01	0.01	1.30	0.01
CE405	0.01	0.01	0.01	24.00	0.01
CE415	0.01	0.01	0.01	24.00	0.01
CE500	0.01	0.01	0.01	24.00	0.01
CE510	0.01	0.01	0.01	24.00	0.01
CE600	0.01	0.01	0.01	24.00	0.01
CE625	0.01	0.01	0.01	24.00	0.01
CE630	0.01	0.01	0.01	24.00	0.01
CE650	0.01	0.01	0.01	24.00	0.01
CE655	0.01	0.01	0.01	24.00	0.01
CE675	0.01	0.01	0.01	24.00	0.01
CE803	0.01	0.01	0.01	24.00	0.01
CE804	0.01	0.01	0.01	24.00	0.01
CE806	0.01	0.01	0.01	24.00	0.01
CE808	0.01	0.01	0.01	24.00	0.01
CE809	0.01	0.01	0.01	24.00	0.01
CE810	0.01	0.01	0.01	24.00	0.01
CE811	0.01	0.01	0.01	24.00	0.01
CE813	0.01	0.01	0.01	24.00	0.01
CE814	0.01	0.01	0.01	24.00	0.01
CE818	0.01	0.01	0.01	24.00	0.01
CE821	0.01	0.01	0.01	24.00	0.01
CE824	0.01	0.01	0.01	24.00	0.01
CE825	0.01	0.01	0.01	24.00	0.01
CE834	0.01	0.01	0.01	24.00	0.01
CE835	0.01	0.01	0.01	24.00	0.01
CE837	0.01	0.01	0.01	24.00	0.01
CE838	0.01	0.01	0.01	24.00	0.01
D020	0.01	0.01	0.01	24.00	0.01
D025	0.01	0.01	0.01	24.00	0.01
D030	0.01	0.01	0.01	24.00	0.01
D040	0.01	0.01	0.01	24.00	0.01
D200	0.01	0.01	0.01	24.00	0.01
D215	0.01	0.01	0.01	24.00	0.01
D220	0.01	0.01	0.01	24.00	0.01
D330	0.01	0.01	0.01	24.00	0.01
L335	0.01	0.01	0.01	24.00	0.01
D340	0.01	0.01	0.01	24.00	0.01
D345	0.01	0.01	0.01	24.00	0.01
E300	0.01	0.01	0.01	24.00	0.01
E310	0.01	0.01	0.01	6.74	0.01
E923	0.20	0.23	0.21	0.25	0.23
E934	0.01	0.01	0.01	5.95	0.01
E936	0.01	0.01	0.01	6.68	0.01
E938	0.01	0.01	0.01	6.26	0.01
E948	3.41	3.46	3.41	0.06	3.46
E957	0.01	0.01	0.01	2.15	0.01
E959	0.01	0.01	0.01	7.64	0.01
Eh_In	0.01	0.01	0.01	24.00	0.01
L010	0.71	0.72	0.71	0.72	0.72
L045_OF	0.01	0.01	0.01	24.00	0.01
L917	0.01	0.01	0.01	24.00	0.01
980	0.65	0.73	0.65	0.73	0.73
L125	0.01	0.01	0.01	24.00	0.01
L976	6.64	6.66	6.64	0.03	6.66
CR21cROSSING	0.01	0.01	0.01	1.30	0.01
L951	0.70	0.77	0.72	0.78	0.77

Table D.1 – Baseline Hydrology SWMM Input/Output

L952	1.89	1.97	1.94	0.08	1.97
L953	0.91	0.99	0.94	0.08	0.99
Q210	0.44	0.49	0.44	0.06	0.49
Q919	0.01	0.01	0.01	0.61	0.01
Q941	0.01	0.32	0.01	0.33	0.32
Q943	0.72	0.76	0.73	0.04	0.76
Q946	0.01	0.01	0.01	0.47	0.01
SPR836	0.01	0.01	0.01	24.00	0.01
52	0.01	0.01	0.01	24.00	0.01
CR44	0.01	0.01	0.01	1.07	0.01
56	0.01	0.01	0.01	1.57	0.01
61	0.01	0.01	0.01	7.22	0.01
64	0.01	0.01	0.01	4.77	0.01

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Analysis begun on:  Tue Sep 16 08:13:11 2014
Analysis ended on:  Tue Sep 16 08:13:14 2014
Total elapsed time: 00:00:03
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APPENDIX E – RELEVANT EXCERPTS

ICON ENGINEERING, INC.

FINAL DRAINAGE REPORT
FOR
PHEASANT HILLS

MILLIKEN, COLORADO

Prepared for:

HALL-IRWIN CORPORATION
3026 4th Avenue
Greeley, Colorado 80631

Prepared by:

TETRA TECH RMC
1900 South Sunset Street, Suite 1-F
Longmont, Colorado 80501

Tetra Tech RMC Job Number 80-0636.050.00

January 2004

TETRA TECH RMC

Detention pond 271 collects offsite runoff from major sub-basins 6 and 262. The offsite runoff (major sub-basin 6) is routed through Channel 262 A before being detained in pond 271. The 100-year storm discharge from pond 271 to the north is 30 cfs controlled by a 20.5" X 20.5" orifice plate. Flow in excess of 30 cfs (13 cfs) is routed to pond 267.

Detention pond 267 collects all the developed runoff from major sub-basin 263. The 100-year storm discharge from pond 267 into pond 270 is 12 cfs. The release is controlled by a 12" X 11.8" orifice plate.

The regional detention pond (pond 21) collects the developed runoff from major sub-basin 272 and the offsite runoff south of the Pheasant Hills site. Following Phase 2 improvements upstream of Pheasant Hills (retention ponds), the 100-year flow reaching the southern edge of the regional detention pond will be 690 cfs. This flow, after overtopping WCR 21, will enter the regional detention pond via the Cutoff Channel. Riprap sizing for the cutoff channel is presented in Exhibit Q. The 100-year storm discharge from pond 21 into pond 270 is 54 cfs. The outlet will be controlled by a 30" storm pipe.

Detention pond 270 collects all the developed flow from major sub-basin 271. The 100-year storm discharge from pond 270 into pond 285 is 61 cfs. The release is controlled by a 36" culvert.

Detention pond 285 collects runoff from major sub-basin 280. The 100-year storm discharge from pond 285 to the north is 30 cfs, controlled by the 30" storm pipe. Flow in excess of 30 cfs (31 cfs) is routed to the east through a 27" culvert under WCR 21 ½, and then into the existing channel on the north boundary of Centennial Farms.

As mentioned above, release from the site will be at three locations. Maximum release at each location is as follows:

1) A north sloping 27" storm pipe approximately 630' in length and then into an existing north sloping channel located on the west side of WCR 21 (Quentine Avenue) that was constructed during the development of Frank Farms. During any storm event, up to 30 cfs will be released into this channel. All discharge over 30 cfs will be discharged to pond 267 and then released.

2) North sloping Channel 285, located on the west side of the WCR 21 ½ (Irene Avenue), will need to be constructed in order for the channel to handle a flow of 30 cfs. Channel 285 has been designed with 4h:1v side slopes, a channel depth of 3 feet (1 foot minimum freeboard), and a slope of 0.30%. The discharge of 61 cfs being released from pond 285 is split with 30 cfs being diverted into the channel along WCR 21 ½.

3) The remaining 31 cfs of the 61 cfs that is released from pond 285 is diverted into the existing channel along WCR 46 at the north boundary of Centennial Farms.

The maximum release from the Pheasant Hills site is 91 cfs, and there are approximately 2,800 acres tributary to the site. The resulting 100-year release rate is 0.032 cfs/acre,

ROCKY MOUNTAIN CONSULTANTS, INC.

825 Delaware Avenue, Suite 500 • Longmont, Colorado 80501
Metro (303) 665-6283 • (303) 772-5282
Fax (303) 665-6959

August 16, 2000

J.R. Schnelzer
Town Manager, Town of Milliken
1101 Broad Street, Drawer 290
Milliken, CO 80543

Re: Preliminary Drainage Report for Settlers Village of the Centennial Development at Milliken, Colorado

Dear Mr. Schnelzer:

This *Preliminary Drainage Report for Settlers Village of the Centennial Development at Milliken, Colorado* is submitted for your review by Rocky Mountain Consultants, Inc. (RMC) on behalf of Hall-Irwin Corporation. The report provides information regarding the historic drainage patterns, proposed storm sewer systems, surface water conveyance facilities and detention ponds. Major drainage components of the surface water facilities including channels and detention facilities have been designed for the 100-year frequency major design storm.

If there are any questions or comments concerning this report, please feel free to contact me.

Sincerely,

ROCKY MOUNTAIN CONSULTANTS, INC.

Prepared by:

Curt Farmer
Engineer

Reviewed by:

Catherine A. Leslie

Catherine A. Leslie, P.E.
Project Manager

H:\0636_053\Drainage\prelim_drainage.WPD

6.2 GENERAL CONCEPT - DETENTION PONDS

The Settlers Village detention ponds will serve several functions. First, the ponds will act as a water feature and continuously hold water. Secondly, the sands and gravel beneath the fine sand overburden will be mined and used as pipe bedding throughout the Centennial Village development. Above the pond outlet invert elevation, volume is available for detention of the developed storm runoff from Settlers Village. Both detention ponds will have sideslopes of 4h:1v minimum.

The outlet rate for the north detention pond (6 cfs) was determined from the available capacity of the proposed 18" storm sewer crossing Center Drive in the Milliken Corporate Center. The north pond outlet pipe will be 18" reinforced concrete pipe that will be bored under Highway 60 and the Beeline ditch, and tie into the drop inlet at Center Drive on the Milliken Corporate Center. The proposed storm sewer system at the Milliken Corporate Center discharges, via system of pipes and open channels to Little Thompson River. For more detail regarding this system, reference the Final Drainage Report and Final Construction Plans for the Milliken Corporate Center. The discharge from the north pond will not reach the maximum of 6 cfs until 2 hours, 35 minutes after the start of the storm. The peak runoff flows from the Milliken Corporate Center will have passed prior to the peak release rate has developed from Settlers Village.

Because of the relatively low release rate from the north pond (6 cfs) and its large required volume, an emergency spillway will be constructed to allow the pond to discharge easterly over WCR 25 in the event a high intensity storm follows one that partially fills the pond. Preliminarily, this spillway will be a broad crested weir of length 35 feet that has been sized to allow the 100 year historic rate to flow easterly with one foot of head on the weir.

The outlet rate from the south pond will also be limited to 6 cfs. The reinforced concrete pipe outlet will discharge to the existing 36" culvert under the railroad tracks east of WCR 25 at WCR 46, and then to the roadside ditch along WCR 46. This ditch continues east along WCR 46 to the South Platte River.

The following is a summary of routed flow results (from UDSWMM and preliminary contours) for the Settlers Village detention ponds:

	North Pond	South Pond
Pond Outlet Invert Elevation	4731.70 ft	4736.70 ft
100 Year Water Surface Elevation	4736.10 ft	4737.85 ft
Emergency Spillway Elevation	4736.20 ft	--------
Minimum Top of Bank Elevation	4738.20 ft	4739.85 ft
Required 100 Year Volume	32.3 ac-ft	9.8 ac-ft
Available Volume with 1 Foot Freeboard	43.3 ac-ft	18.8 ac-ft
100 Year Storm Outlet Rate	6.0 cfs	6.0 cfs

ROCKY MOUNTAIN CONSULTANTS, INC.

RMC

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825 Delaware Ave., Suite 500
Longmont, CO 80501
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Metro (303) 665-6283
FAX (303) 665-6959
(first initial, last name)@long.rmcco

July 10, 2000

J.R. Scheltzner
Town Manager, Town of Milliken
1101 Broad Street, Drawer 290
Milliken, CO 80543

Re: Final Drainage Report for the Colony Pointe Subdivision at Milliken, Colorado

Dear Mr. Scheltzner:

This Final Drainage Report for the Colony Pointe Subdivision at Milliken, Colorado is submitted for your review by Rocky Mountain Consultants, Inc. (RMC) on behalf of Hall-Irwin Corporation. The report provides information regarding the proposed final design of the Colony Pointe storm sewer system. Major drainage components of the surface water facilities were addressed in the Preliminary Drainage Report for Centennial Farms and Colony Pointe Parcels of the Centennial Development at Milliken, Colorado, previously submitted to your office (5/00).

If there are any questions or comments concerning this report, please feel free to contact me.

Sincerely,

ROCKY MOUNTAIN CONSULTANTS, INC.

Prepared by:

Maggie C Berger

Maggie Berger
Project Engineer

Reviewed by:

Kurt Rollin, P.E.
Project Manager

mb
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subsequently conveys the storm water to the regional detention pond. Final design calculations for the street capacities and storm sewer inlet sizes for the Colony Pointe site are included in Exhibit B. The final design calculations for the storm sewer pipe sizing are included in Exhibit C. Roadside ditches are proposed on the east side of Alice Road and on the north side of WCR 46 to convey flows during the initial phase of road development for each. The ultimate build-out for both of these roads will include curb and gutter with storm inlets and sewers to replace the roadside ditches. Calculations are located in Exhibit B2 of the *Preliminary Drainage Report for Centennial Farms and Colony Pointe Parcels of the Centennial Development at Milliken, Colorado.*

All runoff from the site is conveyed to the regional detention pond. The peak inflow contribution from on-site runoff is 61.17 cfs and 178.57 cfs for the 5-year and 100-year storm events, respectively. Total peak inflow and outflow for the regional detention pond are 351 cfs and 54 cfs, respectively from the Supplemental Drainage Study for Centennial Farms and Pheasant Hills Master Plan (RMC 4/00). Calculations for the sizing of the release pipe for the regional detention pond are included in Exhibit C.

This storm sewer system is designed with the understanding and anticipation that the future developed runoff from the upstream areas will be "over detained" within this site. Release rates from these detention ponds will be significantly lower than historic rates.

6.0 CONCLUSION

In conclusion, the proposed development of Colony Pointe will not adversely affect the existing drainage facilities or drainage patterns surrounding the site. Runoff from this site will be conveyed in a series of storm sewers to the regional detention area located on the northeast side of the site. The design of this proposed regional detention facility is such that developed runoff from this site along with runoff from the Centennial Farms parcel, will be detained and released significantly below historic rates and is consistent with previously accepted drainage studies.

A copy of the final drainage calculations, including the storm sewer system design and final drainage plans are contained within this report. See the *Preliminary Drainage Report for Centennial Farms and Colony Pointe Parcels at Milliken, Colorado* for the historic drainage plan.

Culvert Designer/Analyzer Report
Pond 82 Outlet

Analysis Component			
Storm Event	Design	Discharge	54.00 cfs

Peak Discharge Method: User-Specified			
Design Discharge	54.00 cfs	Check Discharge	0.00 cfs

Tailwater Conditions: Constant Tailwater	
Tailwater Elevation	4,747.60 ft

Name	Description	Discharge	HW Elev	Velocity
Culvert-1	1-48 inch Circular	54.00 cfs	4,748.65 ft	4.30 ft/s
Weir	Not Considered	N/A	N/A	N/A

© Haestad Methods, Inc.
Rocky Mountain Consultants
37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

Culvert Designer/Analyzer Report
Pond 82 Outlet

Component:Culvert-1

Culvert Summary			
Computed Headwater Elevation	4,748.65 ft	Discharge	54.00 cfs
Inlet Control HW Elev	4,747.92 ft	Tailwater Elevation	4,747.60 ft
Outlet Control HW Elev	4,748.65 ft	Control Type	Outlet Control
Headwater Depth/ Height	1.00		

Grades			
Upstream Invert	4,744.64 ft	Downstream Invert	4,743.39 ft
Length	446.00 ft	Constructed Slope	0.002803 ft/ft

Hydraulic Profile			
Profile	CompositePressureM1	Depth, Downstream	4.21 ft
Slope Type	N/A	Normal Depth	2.49 ft
Flow Regime	Subcritical	Critical Depth	2.21 ft
Velocity Downstream	4.30 ft/s	Critical Slope	0.004066 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	4.00 ft
Section Size	48 inch	Rise	4.00 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev	4,748.65 ft	Upstream Velocity Head	0.33 ft
Ke	0.50	Entrance Loss	0.17 ft

Inlet Control Properties			
Inlet Control HW Elev	4,747.92 ft	Flow Control	Unsubmerged
Inlet Type	Square edge w/headwall	Area Full	12.6 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

ROCKY MOUNTAIN CONSULTANTS, INC.

RMC

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825 Delaware Ave., Suite 500
Longmont, CO 80501
(303) 772-5282
Metro (303) 665-6283
FAX (303) 665-6959
(first initial, last name)@long.rmcco

July 10, 2000

J.R. Scheltzner
Town Manager, Town of Milliken
1101 Broad Street, Drawer 290
Milliken, CO 80543

Re: Final Drainage Report for the Centennial Farms Subdivision at Milliken, Colorado

Dear Mr. Scheltzner:

This Final Drainage Report for the Centennial Farms Subdivision at Milliken, Colorado is submitted for your review by Rocky Mountain Consultants, Inc. (RMC) on behalf of Hall-Irwin Corporation. The report provides information regarding the proposed final design of the Centennial Farms storm sewer system. Major drainage components of the surface water facilities were addressed in the Preliminary Drainage Report for Centennial Farms and Colony Pointe Parcels of the Centennial Development at Milliken, Colorado, previously submitted to your office (5/00).

If there are any questions or comments concerning this report, please feel free to contact me.

Sincerely,

ROCKY MOUNTAIN CONSULTANTS, INC.

Prepared by:

Rebecca J. Eustice

Rebecca J. Eustice
Engineering Intern

Reviewed by:

Kurt Rollin, P.E.
Project Manager

re
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directly into the detention pond. The detention pond is designed to over-detain the 100-year storm with a total release rate of 6 cfs. Release flows from the detention pond will be discharged into the proposed drainage swale along the north property line. Storm flows in this drainage swale are conveyed to the Colony Pointe regional detention pond. Refer to the *Preliminary Drainage Report for Centennial Farms and Colony Pointe Parcels at Milliken, Colorado* for the details for the Colony Pointe detention pond.

Basins S and T direct drainage to a southern swale. The southern drainage passage alternates between a ditch and storm pipe. It remains as a ditch until the surrounding grading forces the runoff to be carried by pipe. The southern swale joins into the storm drainage system near the intersection of Fair Acres Drive and WCR 23. Together, the swale and the storm system flow into the south end of the detention pond. The northern storm sewer system on the site empties into the northwestern end of the pond.

A "pick-up" ditch has been proposed south of the Hillsboro Ditch to intercept offsite flows from south of the Centennial Farms development. This ditch will convey offsite historic drainage flows around Centennial Farms until the area south of the Hillsboro Ditch is developed. This ditch is separate from the on-site southern drainage swale.

The total release rate from the site is 16.60 cfs for the 5-year storm (with 10.60 cfs of that being undetained flows) and 42.03 cfs for the 100-year storm (with 36.03 cfs of that being undetained flows). This is less than the historic peak runoff of 25.4 cfs for the 5-year storm and 147.0 cfs for the 100-year storm.

Supporting calculations for developed runoff from the Centennial Farms Subdivision are provided in Exhibit A.

6.0 CONCLUSION

In conclusion, the proposed development of the Centennial Farms Subdivision will not adversely affect the existing drainage facilities or drainage patterns surrounding the site. Runoff from this site will be conveyed in a series of storm sewers to a detention pond in the northeast corner of the site. Runoff will then be discharged into a proposed drainage swale and ultimately conveyed to the regional detention pond on the Colony Pointe Subdivision. The design of the proposed regional detention facility is such that developed runoff from both sites will be detained and released significantly below historic rates and is consistent with previously accepted drainage studies.

A copy of the final drainage calculations, including the storm sewer system design and final drainage plans are contained within this report. See the *Preliminary Drainage Report for Centennial Farms and Colony Pointe Parcels at Milliken, Colorado* for the historic drainage plan.

ROCKY MOUNTAIN CONSULTANTS, INC.

•Professional Engineers•

CLIENT: Centennial Farms JOB NO. _____ SHEET 1 OF 1

DESCRIPTION: Detention Pond DESIGNED BY: RJE DATE: 7/6/00

Outlet Structure CHECKED BY: _____ DATE: _____

1.) 100 yr release rate = 6cfs

2.) 10 yr release rate = 0.24 (Area)
= 0.24 (85.94)
= 20.63

* Since the 10 yr. release is larger than the 100 yr release, the outlet structure will be designed for the 100 yr release only.

3.) 100 yr Pond depth

Elevation bottom of pond = 4760

Elevation 100 yr level = 4765.52

Size of Outlet pipe = 1.5' (18")

h = 4765.52 − (4760 + 0.75) → height from center of pipe to water surface at the 100 yr level

= 4.77 ft

4.) Orifice area calculation

$$A = \frac{Q}{C_D (2gh)^{1/2}}$$

A = orifice area

C_D = 0.65 (conversion factor)

Q = release rate

h = water surface height

g = 32.2

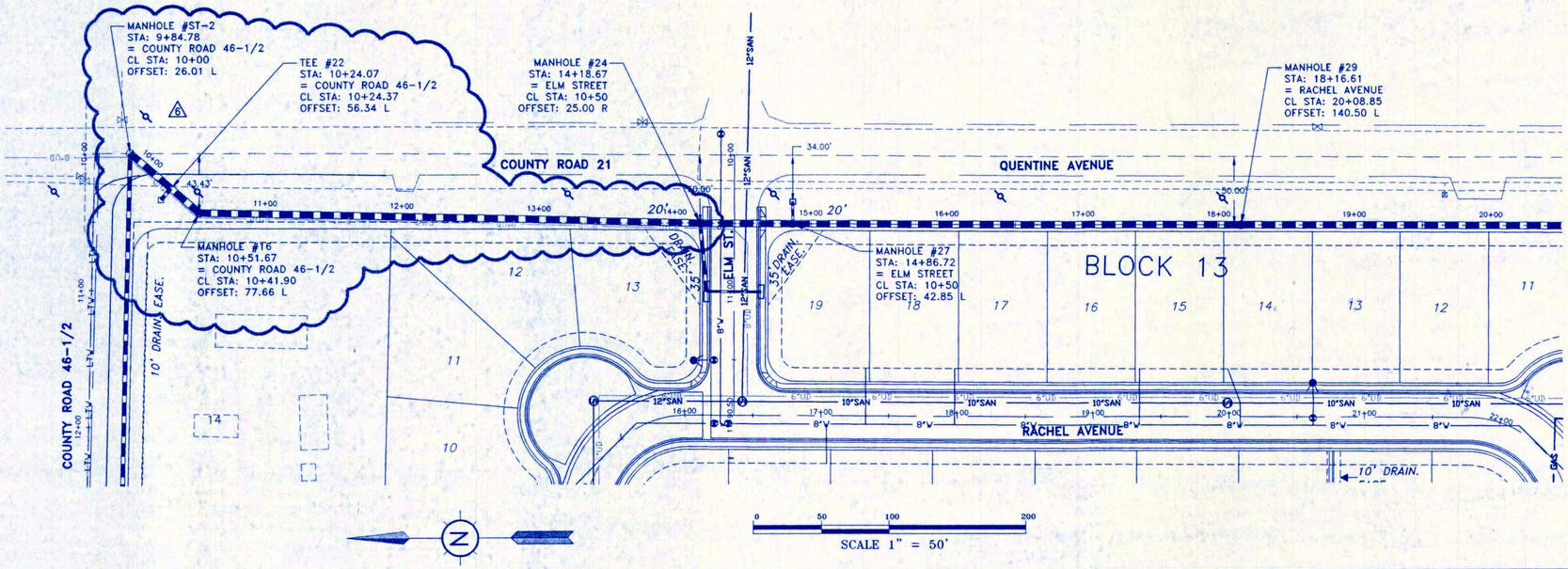
$$A = \frac{6\ cfs}{0.65\sqrt{2(32.2)(4.77)}} = 0.5267\ ft^2$$

5.) Determine plate size

$$(0.5267\ ft^2)\frac{(144\ in^2)}{(1\ ft^2)} = 75.84\ in^2$$

$$\boxed{8 \times 9.5 = 76.0\ in^2}$$

REVISIONS			
REV.	DESCRIPTION	DATE	BY
4	CHANGED MANHOLE DIAMETER	1/27/2000	MWT
6	NEW STORM SEWER ALIGNMENT	3/23/2000	MWT



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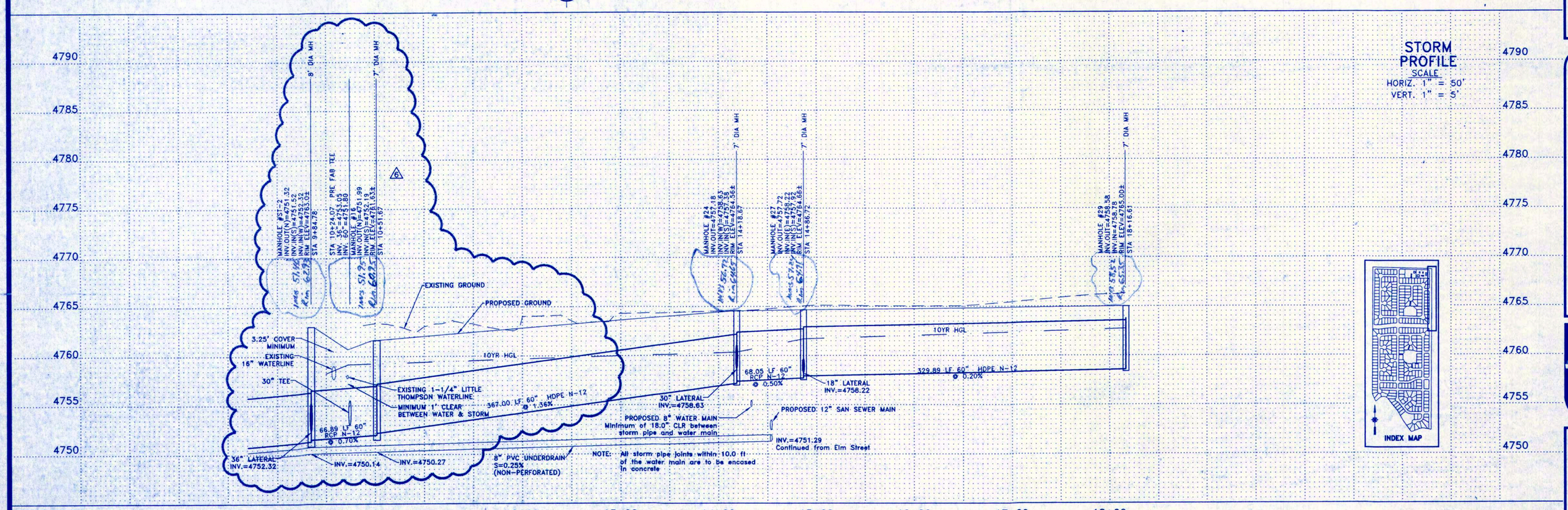


Loonan & Associates, Inc.
Civil Engineers
1630 South College Ave.
P.O. Box 270825
Fort Collins, CO 80527
(970) 493-2808 Fax (970) 495-9735 loonan@verinet.com

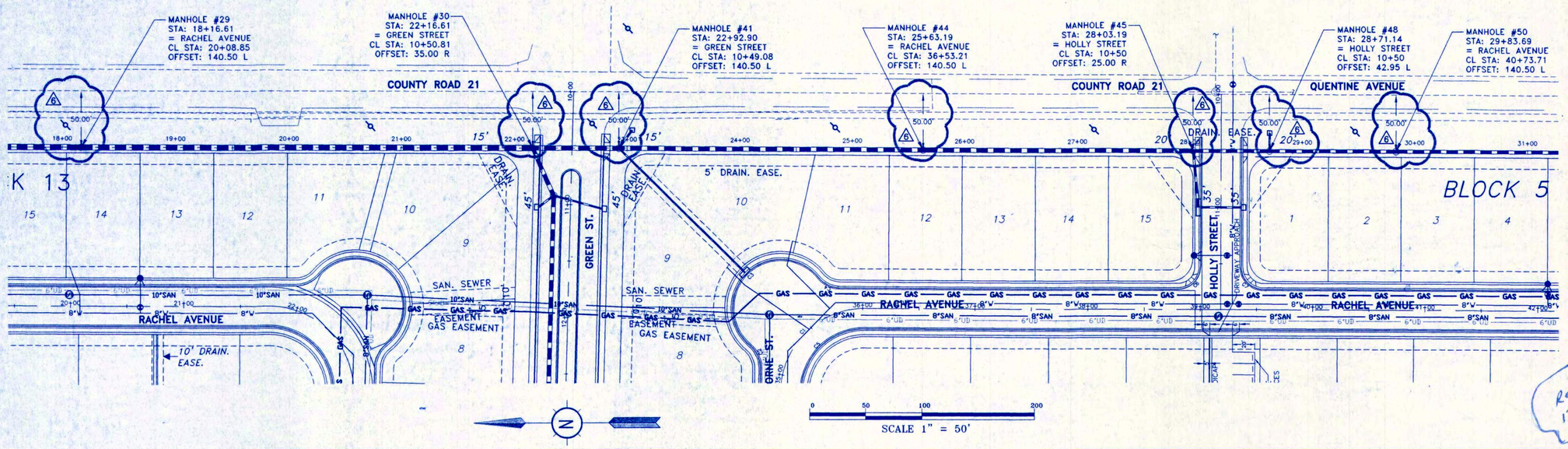
DATE: 11/12/99
SCALE: 1"=50'
DRAWN:
CHECKED: JRL
APPROVED:

MILLIKEN DEVELOPMENT CO., LLC
FRANK FARMS
QUENTINE AVENUE
NORTH
STORM SEWER PLAN & PROFILE

PROJECT No 0014
SHEET 71

Record Drawing

REVISIONS			
REV.	DESCRIPTION	DATE	BY
6	ADDED OFFSET DIMENSIONS TO CL	3/23/2000	MWT



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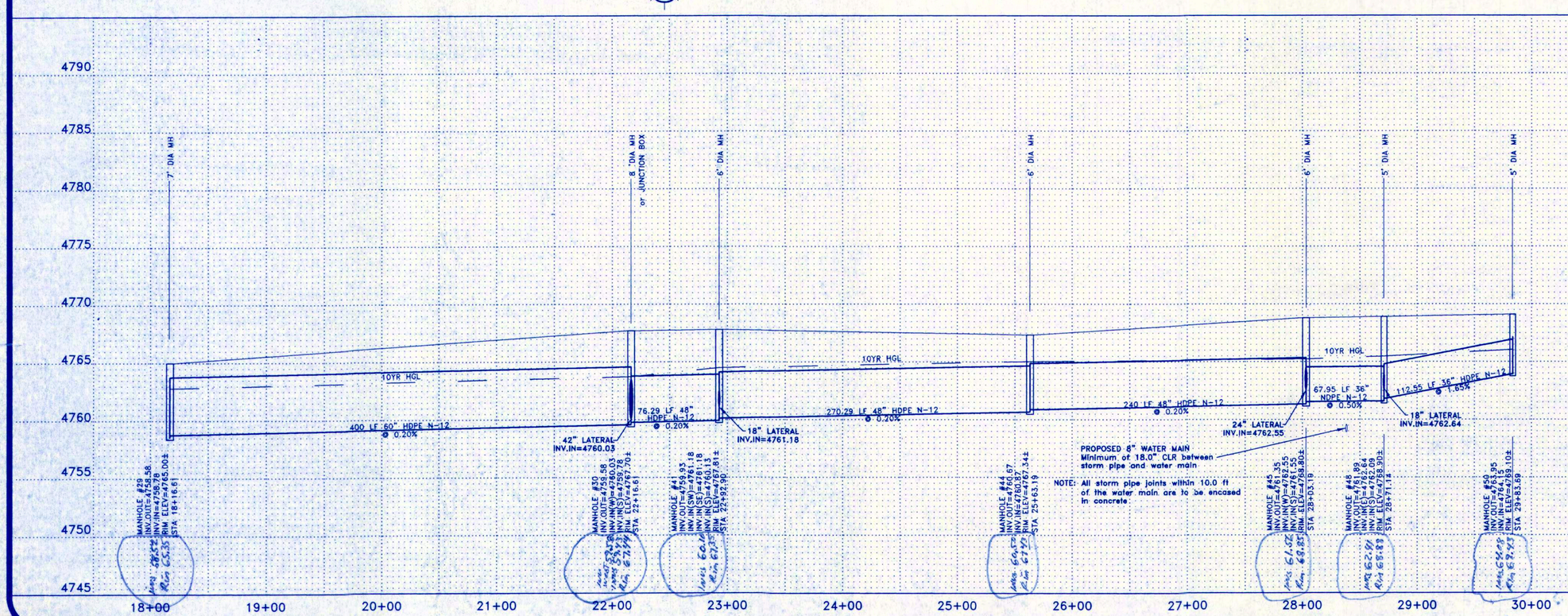


Loonan & Associates, Inc.
Civil Engineers
1630 South College Ave.
P.O. Box 270825
Fort Collins, CO 80527
(970) 493-2808 Fax (970) 495-9735 loonan@verinet.com

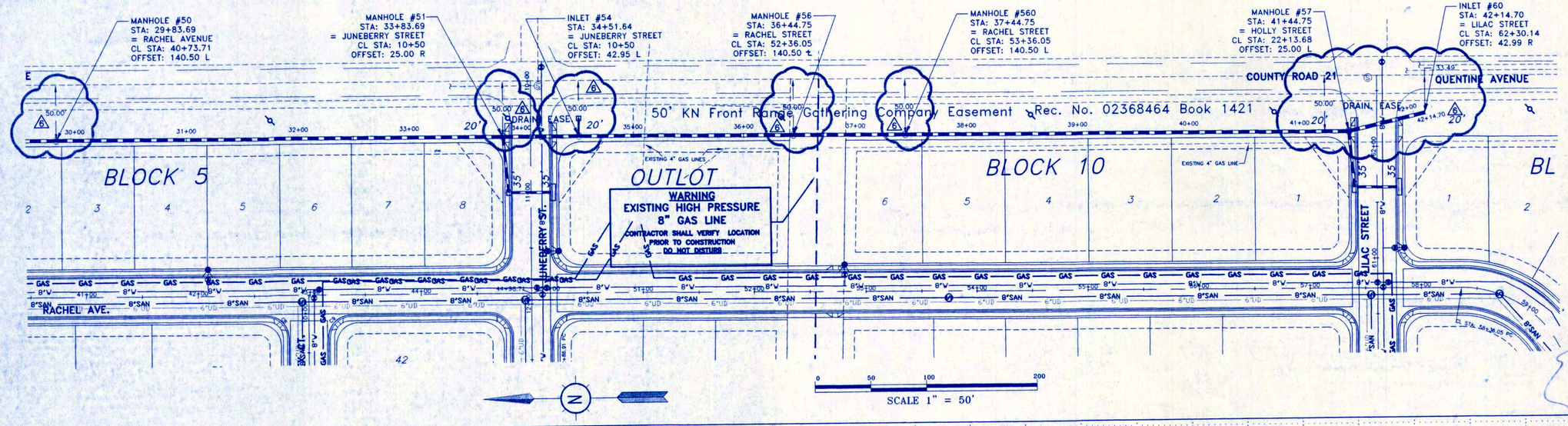
DATE: 10/20/99
SCALE: 1"=50'
DRAWN:
CHECKED: JRL
APPROVED:

MILLIKEN DEVELOPMENT CO., LLC
FRANK FARMS
QUENTINE AVENUE
CENTRAL
STORM SEWER PLAN & PROFILE

PROJECT No 0014
SHEET 72

Record Drawing

REVISIONS			
REV.	DESCRIPTION	DATE	BY
6	REVISED STORM PIPE & MH EL ADDED OFFSETS TO CL	3/22/00	MWT



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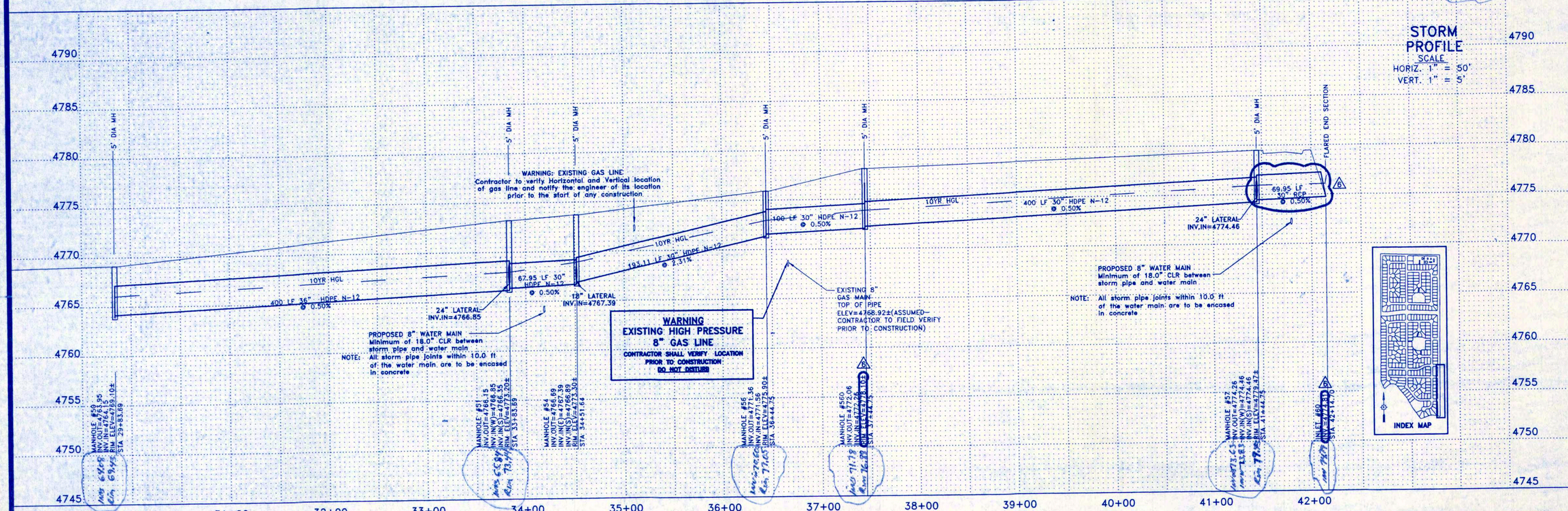


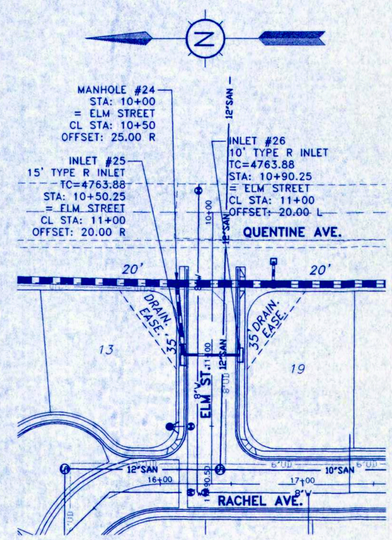
Record Drawing

Loonan & Associates, Inc.
Civil Engineers
1630 South College Ave.
P.O. Box 270852
Fort Collins, CO 80527
(970) 493-2808 Fax (970) 495-9735 loonan@verinet.com

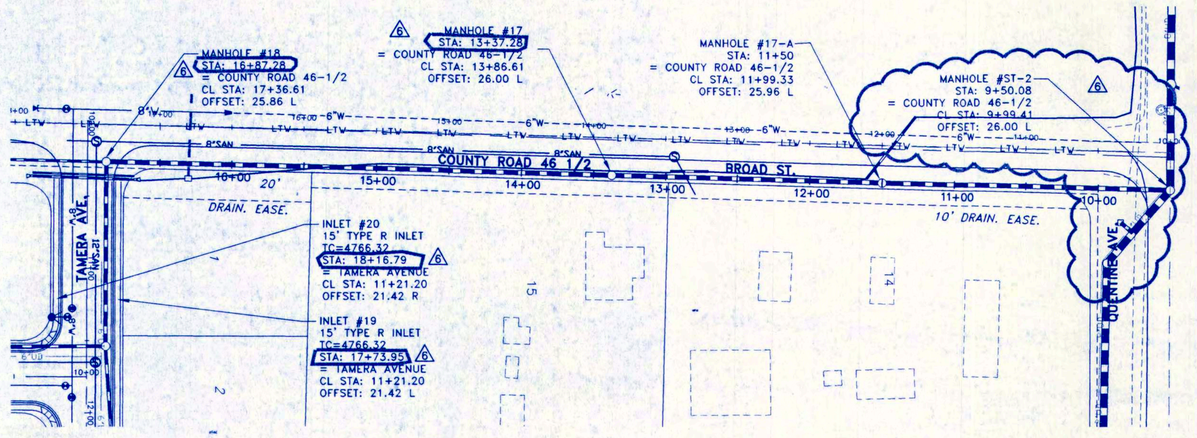
DATE: 11/29/99
SCALE: 1"=50'
DRAWN:
CHECKED: JRL
APPROVED:

MILLIKEN DEVELOPMENT CO., LLC
FRANK FARMS
QUENTINE AVENUE
SOUTH
STORM SEWER PLAN & PROFILE

PROJECT No 0014
SHEET 73

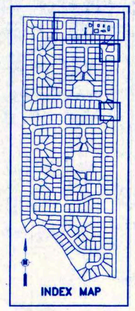


ELM STREET



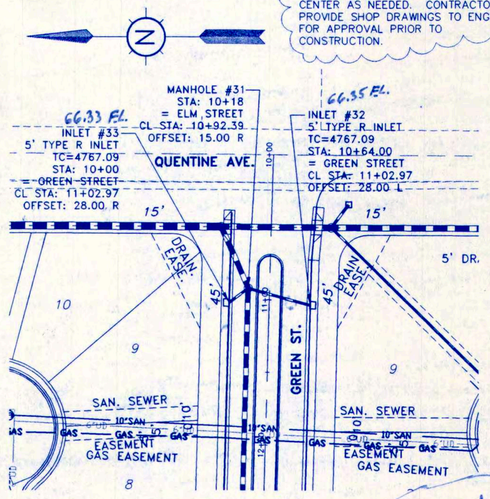
BROAD STREET

SCALE 1" = 50'



REVISIONS			
REV.	DESCRIPTION	DATE	BY
4	CHANGED MANHOLE DIAMETER	1/27/2000	MWT
6	CHANGED MANHOLE LOCATION	3/23/2000	MWT
12	REVISED PROFILE	6/27/01	KZ

NOTE:
THE SOUTH END OF THE 18" STORM PIPE IS TO BE OFFSET FROM MANHOLE CENTER AS NEEDED. CONTRACTOR TO PROVIDE SHOP DRAWINGS TO ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION.



GREEN STREET

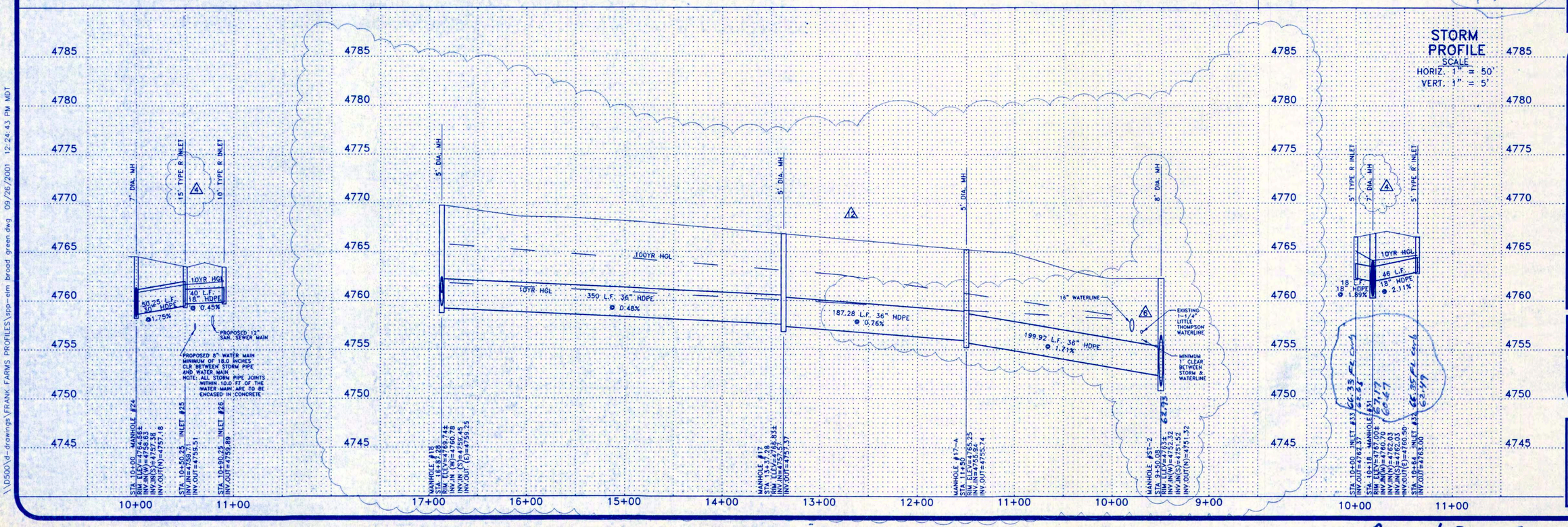
Record 12/12/01

Loonan & Associates, Inc.
Civil Engineers
1630 South College Ave.
P.O. Box 270852
Fort Collins, CO 80527
(970) 493-2808 Fax (970) 495-9735 loonan@verinet.com

DATE: 11/29/99
SCALE: 1"=50'
DRAWN:
CHECKED: JRL
APPROVED:

MILLIKEN DEVELOPMENT CO., LLC
FRANK FARMS
ELM, BROAD, & GREEN STREETS
STORM SEWER PLAN & PROFILE

PROJECT No 0014
SHEET 74



Record Drawing

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REVISIONS			
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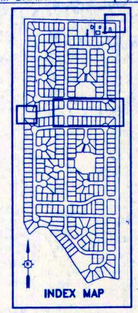
6	CHANGED STORM DRAIN	3/23/2000	MWT



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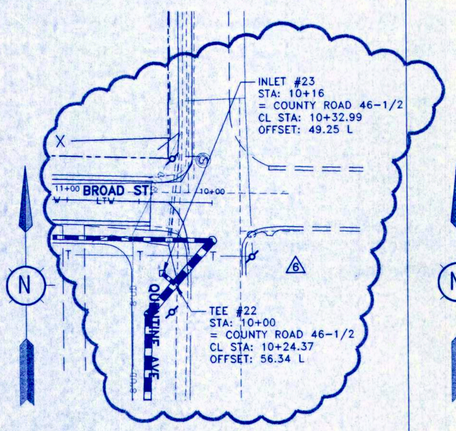
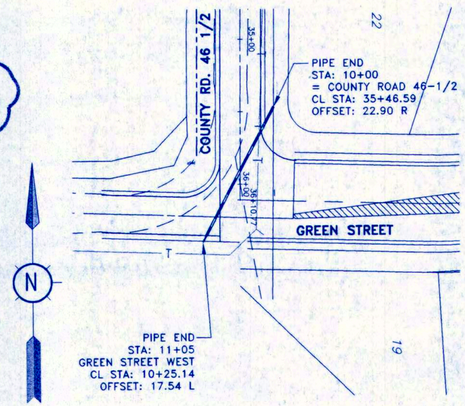
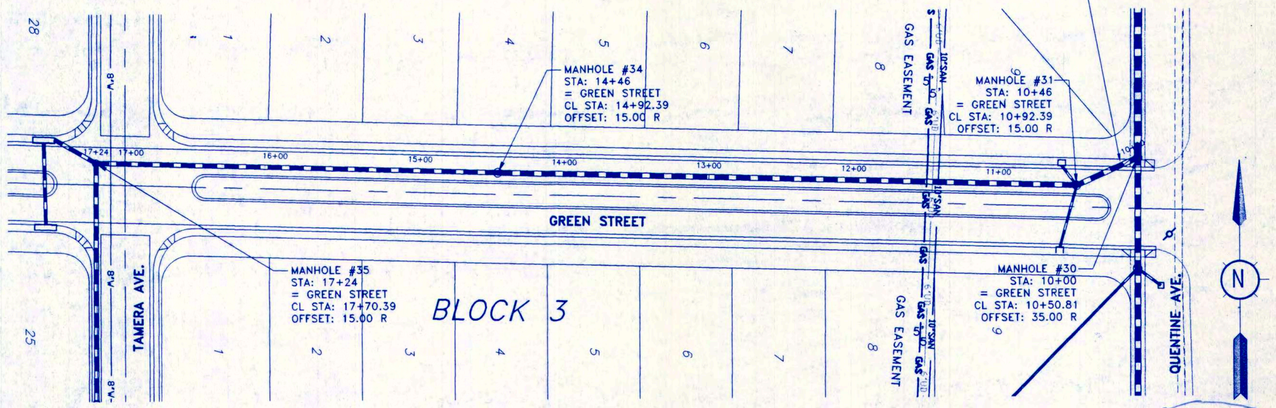


BROAD STREET



COUNTY ROAD 46-1/2



0 50 100 200
SCALE 1" = 50'

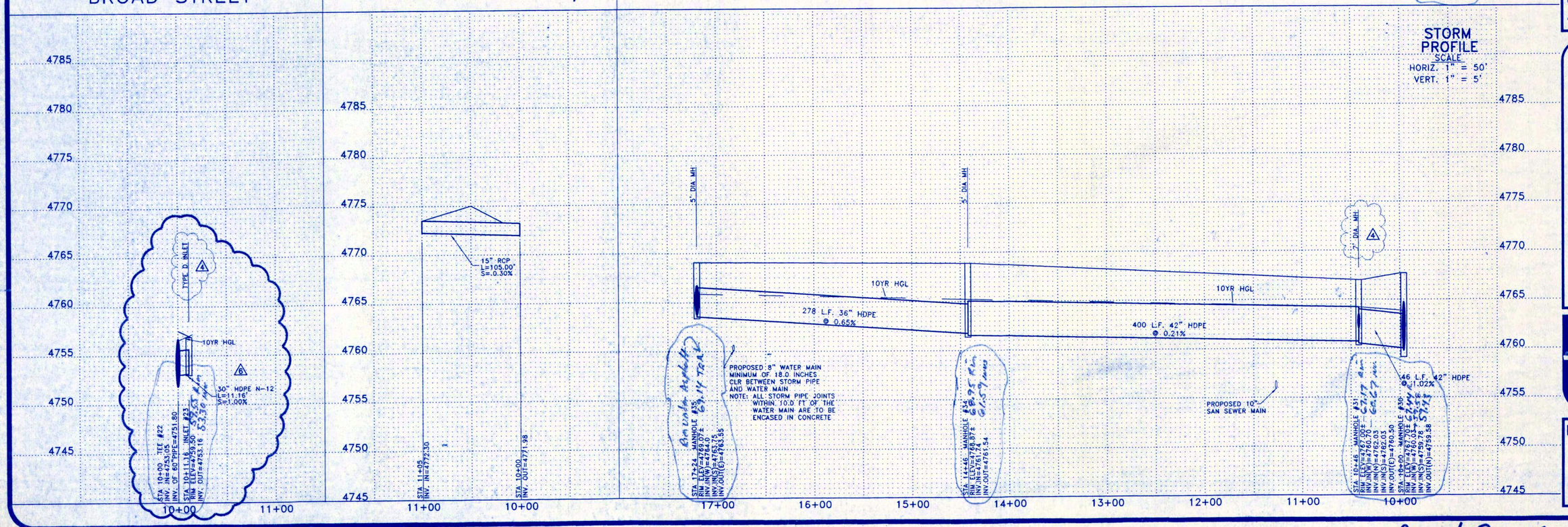
GREEN STREET

Record 12/12/01

DATE: 11/29/99
SCALE: 1"=50'
DRAWN:
CHECKED: JRL
APPROVED:

MILLIKEN DEVELOPMENT CO., LLC
FRANK FARMS
COUNTY RD. 46 1/2, GREEN STREET
STORM SEWER PLAN & PROFILE

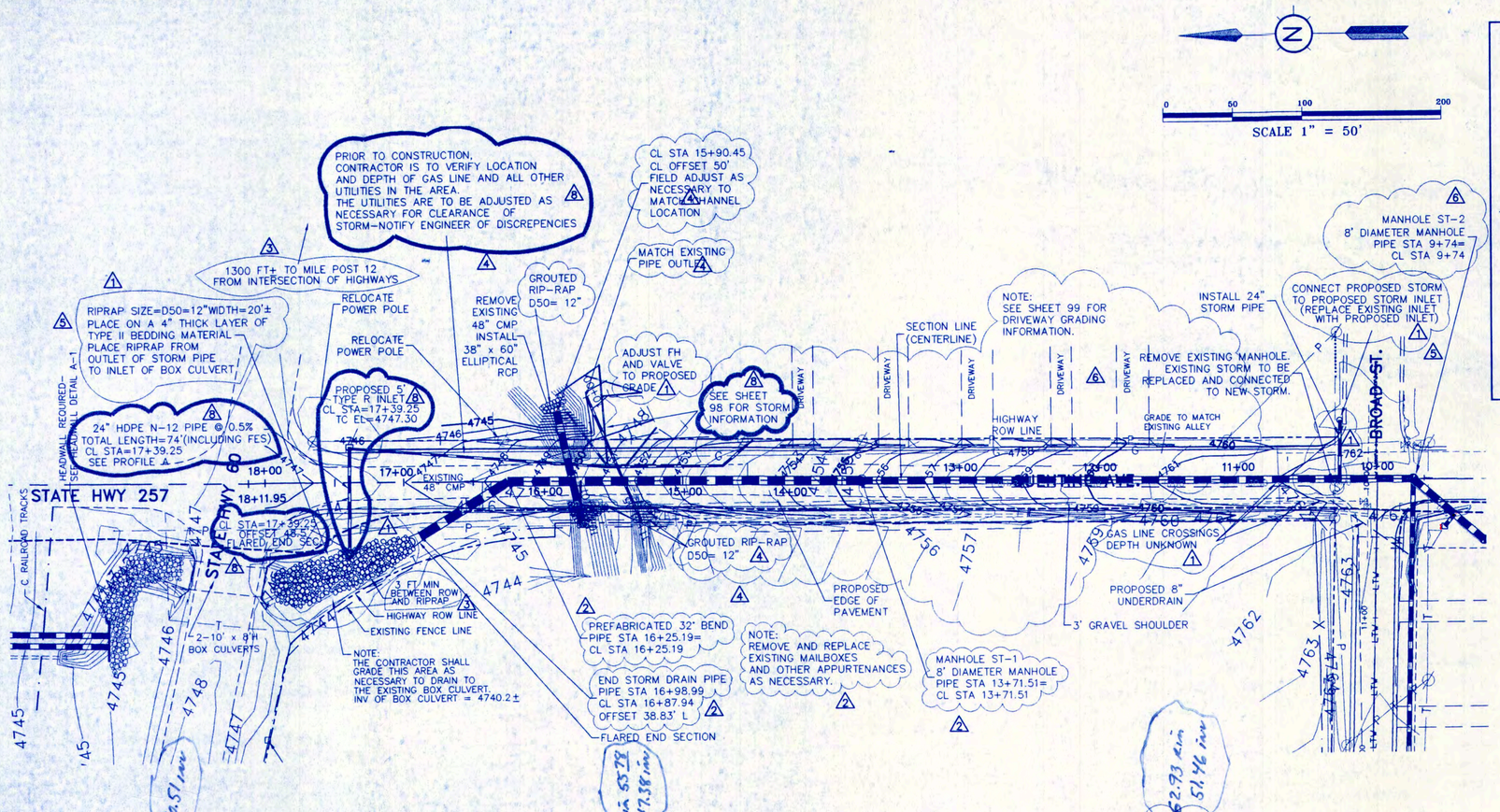
STORM PROFILE
SCALE
HORIZ. 1" = 50'
VERT. 1" = 5'

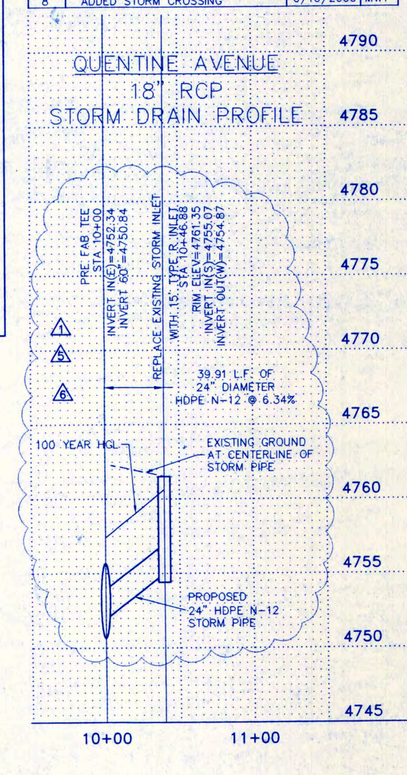


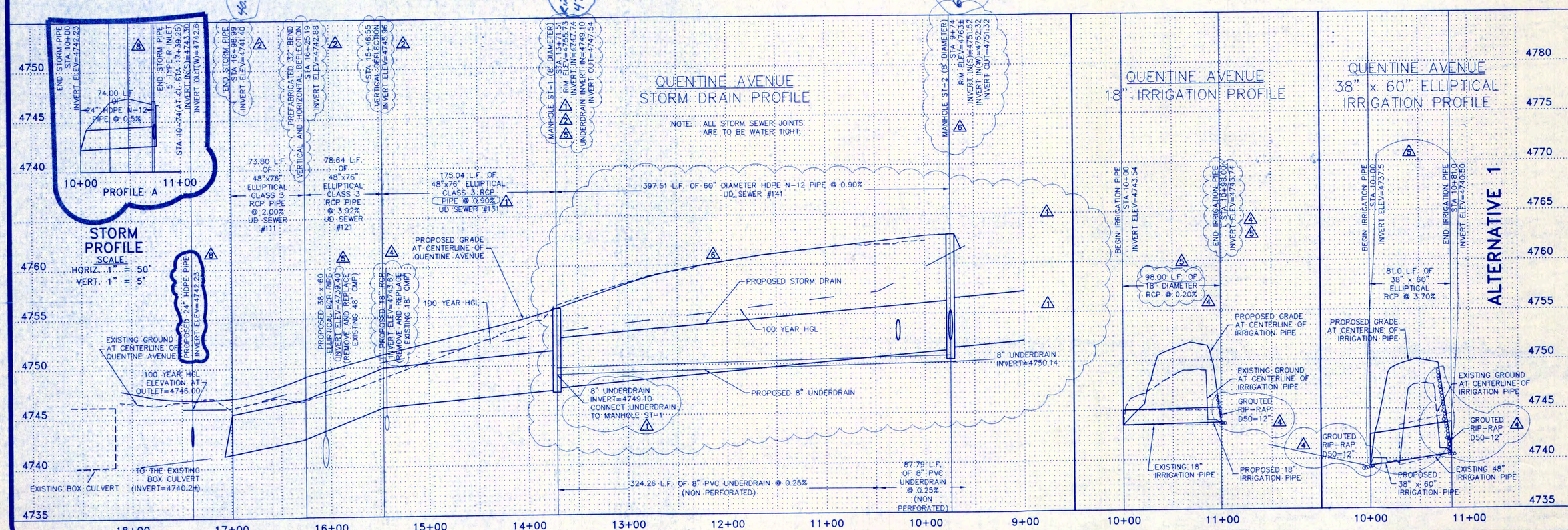
PROJECT No
0014
SHEET
75

Record Drawing

REVISIONS			
REV.	DESCRIPTION	DATE	BY
1	STORM REVISIONS/DRIVEWAYS	1/7/2000	MWT
2	CHANGE STORM STATIONING	1/11/2000	GSF
3	NOTES	1/12/2000	MWT
4	REVISED MANHOLE DIA. / RIP RAP	1/27/2000	MWT
5	REVISED STORM MANHOLE	1/27/2000	MWT
6	REVISED NORTH QUENTINE AVE	3/23/2000	MWT
	REVISED EAST ROW. RIP-RAP		
	REVISED MANHOLE ST-2		
8	ADDED STORM CROSSING	6/16/2000	MWT







Loonan & Associates, Inc.
Civil Engineers
1630 South College Ave.
P.O. Box 270852
Fort Collins, CO 80527
(970) 493-2808 Fax (970) 495-9735 loonan@verinet.com

DATE:12/21/99
SCALE: 1"=50'
DRAWN: GSF
CHECKED: MWT
APPROVED: JRL

MILLIKEN DEVELOPMENT CO., LLC
FRANK FARMS
QUENTINE AVENUE
STORM DRAIN PLAN & PROFILE

PROJECT No
0014
SHEET
80

Record Drawing

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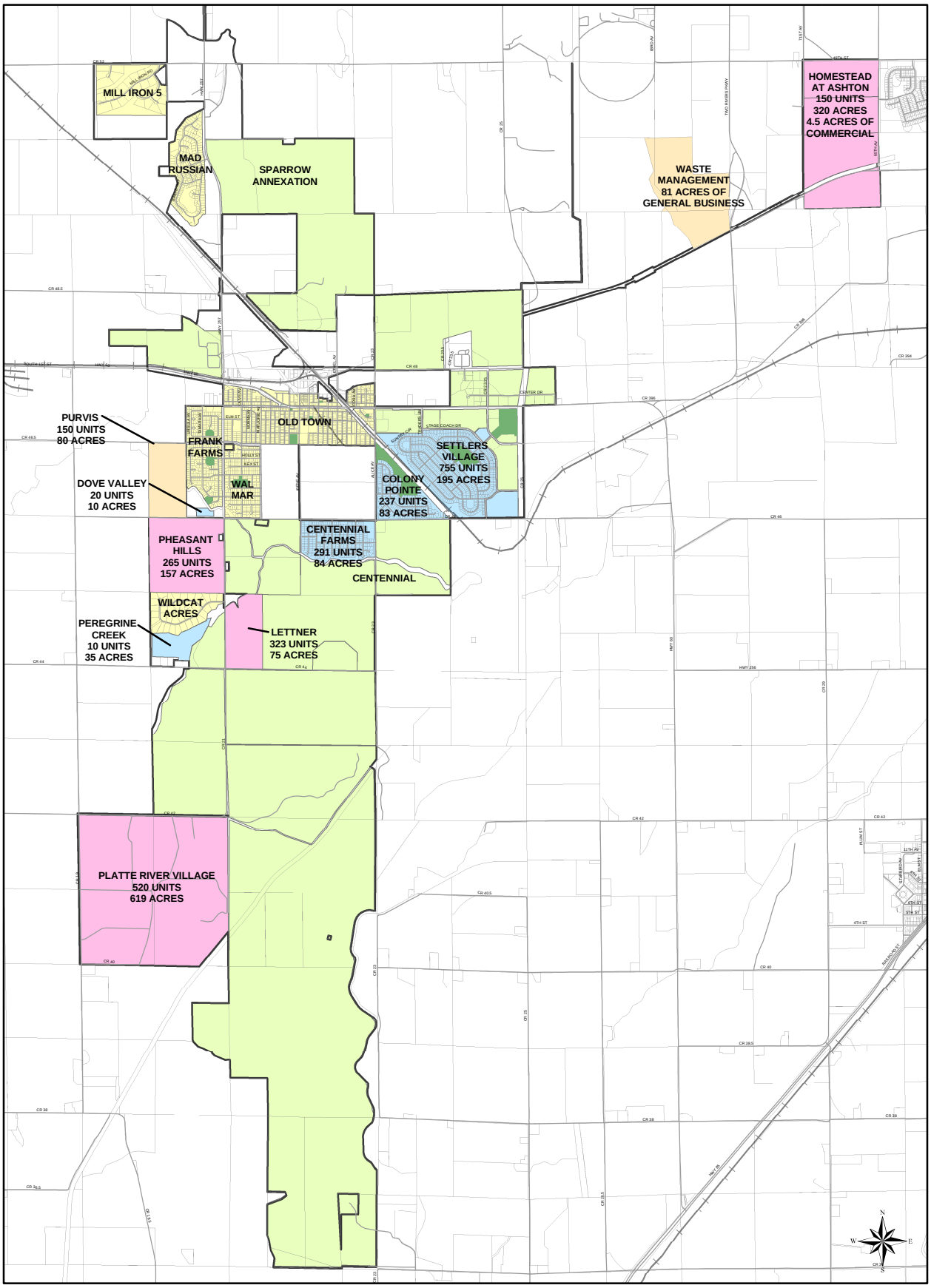

- DEVELOPMENT APPLICATION RECEIVED
- UNDER CONSTRUCTION
- FUTURE ANNEXATIONS
- LAND TO BE DEVELOPED
- DEVELOPED MILLIKEN
- TOWN BOUNDARY

ESTIMATED MILLIKEN GROWTH

0 2,500 5,000 7,500
Feet

TOWN OF MILLIKEN
1101 Broad Street
Milliken, CO 80543
(970) 587-4331
(970) 587-2678 Fax