CITY OF ALBUQUERQUE
DEPARTMENT OF MUNICIPAL DEVELOPMENT

FINAL DESIGN ANALYSIS REPORT

For

STORM WATER QUALITY IMPROVEMENTS AT LOMAS AND LOUISIANA

PROJECT NO. 730491

AUGUST 2013

SMITH ENGINEERING COMPANY

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Certification

I, Patrick J. Conley, being duly registered as a Professional Engineer under the laws of the State of New Mexico, do hereby certify that this document was prepared under my direction and is true and correct to the best of my knowledge and belief.

Signature

07/31/2013
Date

Patrick J. Conley, PE, NM # 10141

CONTENTS

I. INTRODUCTION

This report presents the results of the analysis for the improvement of storm water quality for off-site flows that reach the Racetrack Detention Basin located within EXPO New Mexico. This analysis report recommends an alternative that seeks to improve water quality and eliminate illicit discharges from EXPO Concentrated Animal Feed Operations (CAFO) into the City's Municipal Separate Storm Sewer System (MS4). This will be accomplished by permanently sealing the existing inlets within the CAFO area and by eliminating the potential for flooding from the Racetrack Detention Basin which currently inundates the CAFO area.

The project area is roughly bounded by Lomas Boulevard on the north, Central Avenue on the South, Louisiana Boulevard on the east, and San Pedro Drive on the west (refer to Exhibits 1 and 2: Project Vicinity Map and Project Location Map).

City of Albuquerque (COA) drainage infrastructure assets within the EXPO property currently convey storm water runoff collected from both on- and off-site basins to the existing storm drain system in San Pedro Drive. The existing drainage system within the EXPO property (hereafter referred to as the On-Site system) includes the Racetrack Detention Basin, the San Pedro North and South Ponds at the northwest corner of the EXPO property, and on-site storm drain pipe. The On-Site system delivers flows into the existing San Pedro storm drain system which extends from Domingo Road on the south to its outfall at the Embudo Arroyo (Interstate 40 Channel) on the north.

The hydrology and hydraulics for the On-Site system and for the adjoining San Pedro system were analyzed to gain an understanding of the interaction between the two systems and the impacts of the proposed storm water quality improvements. Detailed information describing these analyses and their results are included in Appendices A and B. From these analyses, three design options were developed and are presented in this report with one selected as the recommended option. All three design options fulfill the project goal of improving storm water quality by preventing the possibility of regional storm water entering the EXPO horse barn area and becoming commingled with CAFO water.

II. PROJECT GOAL

The primary goal of this project is to improve storm water quality by eliminating the potential for discharges from the EXPO CAFO area from entering the City's MS4. This goal will be achieved by preventing storm water from entering the CAFO area as a result of flooding occurring in the racetrack infield and by permanently sealing storm drain inlets within the CAFO area. The following summary describes the existing storm water quality challenges, proposed improvements, and how each improvement relates to the project goal:

The On-Site storm drain system currently collects and conveys runoff generated both on- and off-site, each of which produce water quality challenges. The off-site runoff is generated in an urban watershed

which tends to carry pollutants including trash, fluids from vehicles, and organic debris. The on-site runoff generated within the EXPO site has historically contained many of these same contaminants plus animal waste generated in the CAFO area. The CAFO area is located on the north end of the EXPO property and largely consists of horse barns (see Exhibit 2: Project Location Map). It should be noted that illicit discharges from the CAFO area are no longer possible due to execution by EXPO staff of their CAFO waste discharge mitigation plan.

The 100-year, 24-hour storm event was used to complete the storm water runoff analyses (per COA design criteria). From these analyses it was determined that in existing conditions the Racetrack Detention Basin overtops and inundates the racetrack infield. The high water surface elevation will reach the crest elevation of the west vehicle access tunnel in the northwest portion of the racetrack infield (shown on Exhibit 2: Project Location Map). At this crest elevation, storm water will spill down the access tunnel and into the CAFO area. The storm water will become commingled with CAFO water and flow to the CAFO retention dam.

To accomplish the project goal of eliminating the potential for discharges from the CAFO area into the On-Site system, improvements are proposed to increase the volumetric capacity of the Racetrack Detention Basin. The increase in pond volume (while not increasing the pond outflow rate) will eliminate flooding from the Racetrack Detention Basin into the horse barn area by eliminating the inundation of the west infield access tunnel. Additionally, improvements are proposed to permanently remove the inlet connections within the horse barn area with the On-Site storm drain system. Improving storm water quality at the EXPO property through these means will contribute to the COA's storm water management program in accordance with the COA's MS4 permit (NPDES No. NMS000101) from the Environmental Protection Agency (EPA).

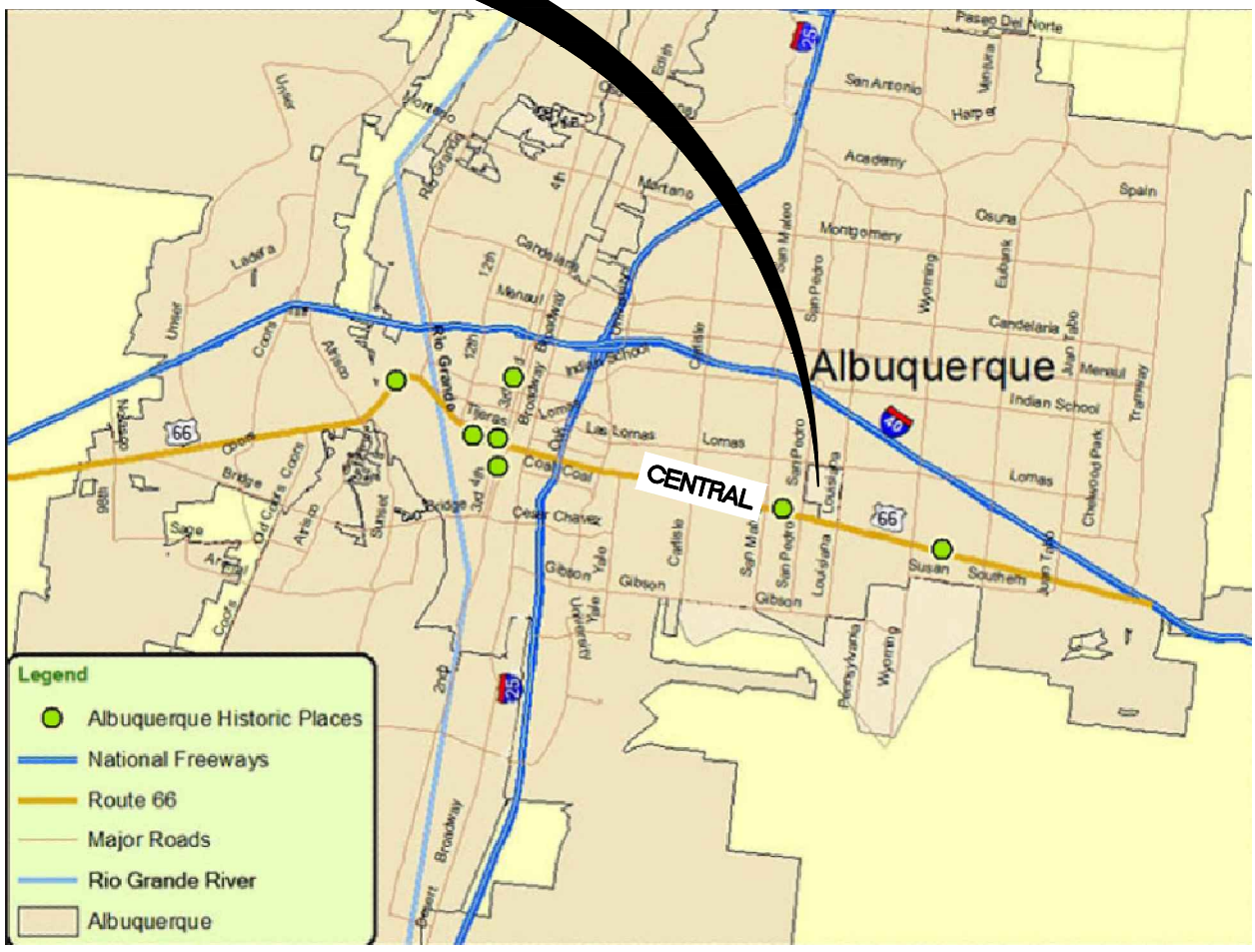
III. DATA COLLECTION AND REVIEW

Past Drainage Studies

Numerous drainage studies were reviewed to complete the hydrology portion of this study. These include pertinent sections of the following reports:

- *Albuquerque Master Drainage Study* (Bohannan-Huston, Inc., 1981)
- *Storm Drain Investigation Report for San Pedro Boulevard and the New Mexico State Fairgrounds* (Smith Engineering Company, 1995)
- *Campus Wash Drainage Basin* (Smith Engineering Company, 2008)
- *Design Analysis for Moon Street Storm Drain* (Bohannan-Huston, Inc., 2007)
- *Plan for Elimination of CAFO Waste Discharge to Municipal Storm Drain by EXPO New Mexico* (THE Group, 2012)

PROJECT VICINITY



PROJECT VICINITY MAP

NONE

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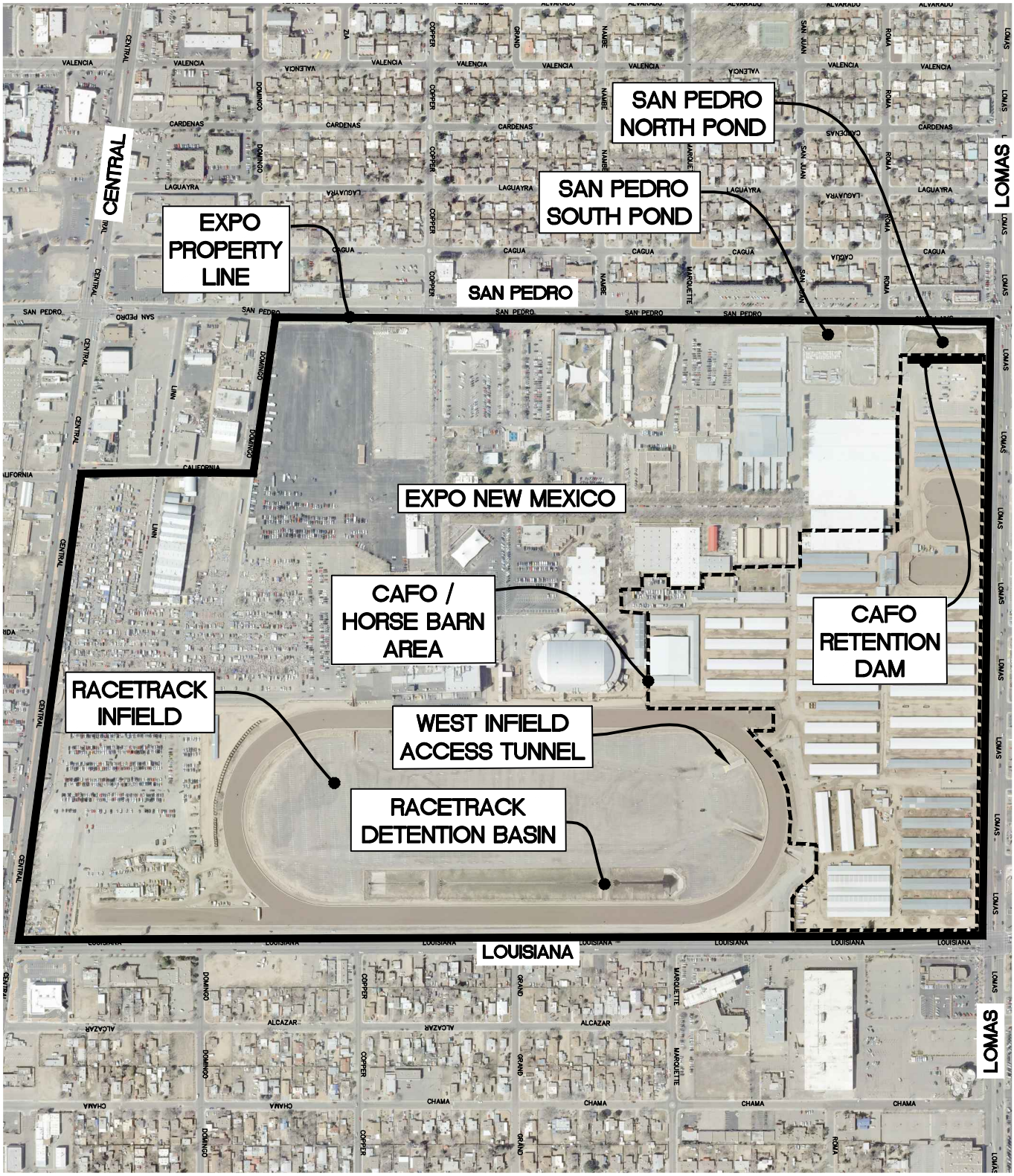
AT LOMAS AND LOUISIANA

PROJECT VICINITY MAP

PROJECT NO: 730491
DATE: AUGUST 2013
SHEET NO: EXHIBIT 1



LEGEND

EXPO PROPERTY LINE

LIMITS OF CAFO AREA

PROJECT LOCATION MAP

NONE

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PROJECT LOCATION MAP

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SHEET NO: EXHIBIT 2

Review of Existing Storm Drain Infrastructure

To aid in both the hydrologic and hydraulic analyses, existing storm drain infrastructure was reviewed using COA GIS data and record drawings for the following storm drain projects:

- Dallas St., Pennsylvania St. Interceptor Storm Sewer (COA Project No. 860460)
- Wyoming Storm Sewer (COA Project No. 865165)
- Moon Street Storm Drain, Phase 1 (COA Project No. 781502)
- Moon Street Storm Drain, Phase 2 (COA Project No. 781503)
- Central Heights Storm Sewer (COA Project No. 857257)
- Fairgrounds Storm Water Relief System, Phase 1 (COA Project No. 154383)
- San Pedro Storm Drainage and Utility Improvements (COA Project No. 461090)
- Site Drainage Improvements, New Mexico State Fair (COA Project No. 982006)

Mapping

Survey data for the following items was obtained by Surveying Control, Inc. for completion of this study:

- Storm manhole rims in San Pedro Drive and Louisiana Boulevard
- Storm manhole rims and inverts for the existing 48" diameter storm drain within the project area.
- Sanitary sewer manhole rims and inverts within the project area.
- Top and toe of Racetrack Detention Basin, San Pedro North Pond and San Pedro South Pond.

The 2010 MRCOG LIDAR orthoimagery and topographic data for the area were converted from grid to ground coordinates and combined with the survey data to produce an overall study map. The study map was used to delineate drainage basin boundaries and determine land use treatments for the hydrologic analysis, and to determine manhole locations and pipe lengths for the hydraulic analysis.

IV. EXPO ON-SITE IMPROVEMENTS

On April 17, 2013, the City of Albuquerque met with representatives from EXPO New Mexico to discuss and coordinate efforts to improve storm water quality and eliminate the potential for illicit discharges into the MS4. It was through this meeting that the City became aware of the extensive improvements being implemented by the EXPO to address storm water quality on-site.

Efforts made by EXPO New Mexico to address storm water quality and illicit discharges from the CAFO areas have been implemented with the construction of a retention/evaporation dam along the east edge of the San Pedro North Pond (see Exhibit 2: Project Location Map). Storm water runoff from the horse barn area containing CAFO waste will be conveyed in a series of graded swales to the dam. The dam will retain the runoff generated during the 25-year, 24-hour storm event in accordance with EPA regulations. This retained runoff will be treated on-site. Once testing of the retained storm water indicates that allowable water quality standards have been met, the storm water may be discharged to the municipal storm drain system. The storm water will be discharged via a valve-controlled outlet pipe at the bottom of

the CAFO retention dam, which goes west through the dam and outfalls into the San Pedro North Pond. From the San Pedro North Pond, the storm water will discharge into the San Pedro Storm Drain. Per the EPA, runoff in excess of the 25-year, 24-hour storm event will be allowed to overtop the dam and be discharged directly into the San Pedro North Pond and then into the San Pedro Storm Drain system.

CAFO process water is now plumbed to an underground cistern and discharged into the sanitary sewer system. An EXPO permit with the Albuquerque Bernalillo County Water Utility Authority (ABCWUA) has allowed this discharge.

Within the horse barn area, there are several storm drain inlets that have historically discharged into the On-Site system. These inlets have been capped as part of the EXPO plan to eliminate any commingled storm water discharges into the On-Site system and MS4. Efforts to be made by the City to complement these improvements include increasing the capacity within the Racetrack Detention Basin and permanently sealing the existing inlets to ensure the complete separation of CAFO runoff and the MS4.

All design options presented in this report were developed to meet the EXPO's requests and to minimize disruption to EXPO operations both during construction and after construction is complete. Use of existing storm drain infrastructure to the maximum extent possible will assist in fulfilling these requests. The condition of the existing EXPO On-Site system has been evaluated to ensure its suitability for storm water conveyance. To evaluate the condition of the existing system, the on-site storm drain pipe was cleaned and videotaped. While some minor repairs are required, review of the videotape reveals that the on-site storm drain pipe is in generally good condition and is suitable for the use of storm water conveyance. See Appendix D for detailed results of the storm drain condition assessment and recommended repairs. The estimated cost for recommended repairs is $100,000 and is included in the construction cost estimates for each design option. Refer to Section VI, Construction Costs for summaries of the cost estimates, or to Appendix C for detailed cost estimates.

V. STORM WATER QUALITY

As mentioned, the proposed storm water quality improvements that include modifications to the Racetrack Detention Basin and On-Site storm drain system will complement and reinforce the improvements already being implemented by the EXPO. Please refer to the *Plan for Elimination of CAFO Waste Discharge to Municipal Storm Drain by EXPO New Mexico* (THE Group, 2012) for more information on the EXPO on-site improvements.

Improvement of storm water quality is the primary component of this project. The amount of storm water stored in the Racetrack Detention Basin makes it an ideal location for additional storm water quality features as the pollutants contained in 43 acre-feet of water can be significantly reduced with improvements made at a single location. All three design options address the following storm water quality elements at the Racetrack Detention Basin:

Sedimentation and Pollutant Settling: By virtue of the fact that the pond is designed to detain storm water, the pond acts as a large sedimentation basin. Pollutants typically found in urban areas are often attached to sediment that is present in the streets. The detention of storm water in the pond will encourage sediment deposition and with it, the pollutants that are attached to the sediment.

Native Grass Seeding: Native grass seeding on the pond bottom will provide a great degree of pollutant load reduction. This is affected by the grass absorbing runoff and some of the waterborne pollutants that enter the basin in small storm events, and absorbing the pollutants that may be present in the runoff. The grass root system also contributes to less sediment entering the pond discharge in that the root system prevents soil erosion during larger storm events. Native grasses are proposed to be planted in the Racetrack Detention Basin as part of each of the design options for improving the overall system performance.

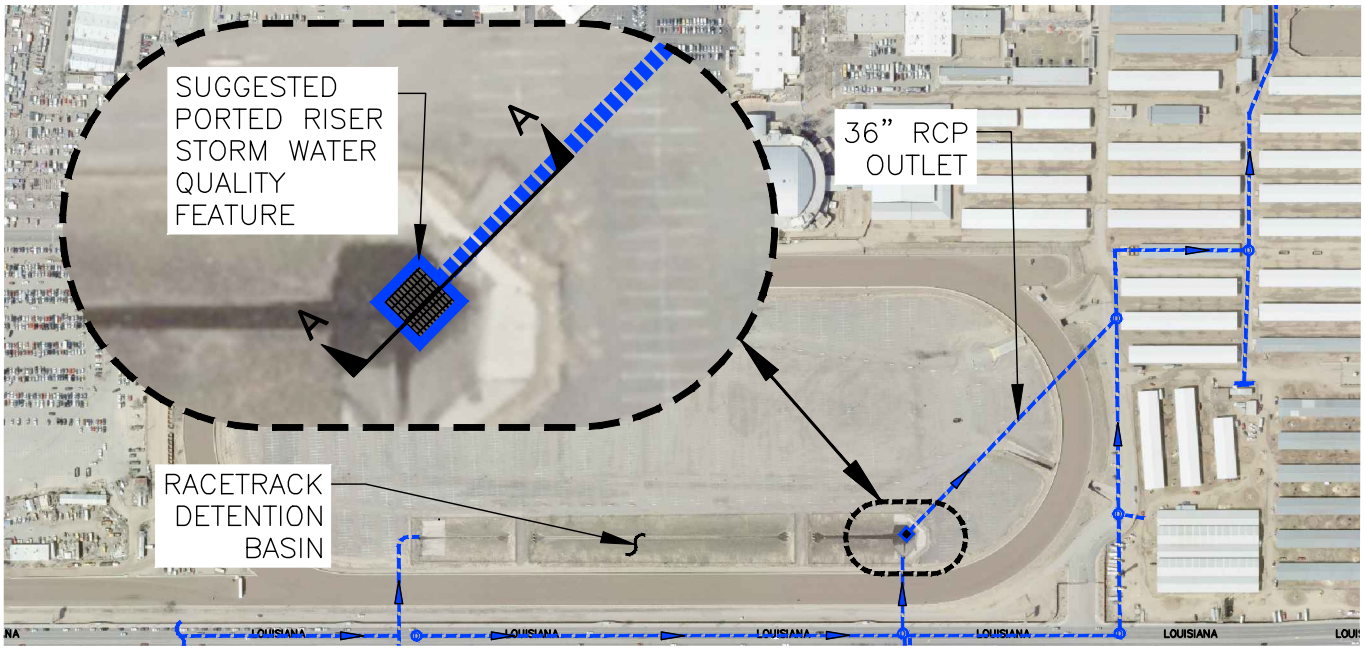
Floatable Collection: A new water quality outlet structure will be placed at the pond outlet to keep floatables within the detention basin and out of the primary spillway (36" diameter outlet pipe). A sketch illustrating one possible outlet structure that may be used is shown in Exhibit 3. The chain link fence at the top of the pond will also act as a floatable collection device for Design Options 1 and 2. The chain link fence will prevent floatables from entering the racetrack infield during larger storm events where the water surface elevation exceeds the Racetrack Detention Basin top of pond elevation.

Separation of CAFO Water from MS4 Water: Each of the proposed improvements in this report allow the Racetrack Detention Basin to overtop during a 100-year, 24-hour storm event and flood the infield of the racetrack but do not allow flood waters to flow through the racetrack infield access tunnel and then to the CAFO area. Additionally, the existing inlets within the CAFO area have been capped and will be permanently sealed to prevent discharges from the CAFO area from entering the municipal system. The method of sealing the inlets may vary based on the location, type, and condition of each inlet. Possible methods for permanently sealing the inlets include welding a steel plate onto the inlet, or removing and disposing of the inlet and plugging the existing lateral.

VI. HYDROLOGIC AND HYDRAULIC ANALYSES

The hydrologic analysis for this study was performed according to the criteria and methodology from the COA Development Process Manual, Volume 2, Chapter 22. The 100-year, 24-hour event is used as the design storm as the project includes several detention basins. Direct runoff hydrographs were computed using the Arid Lands Hydrologic Model (AHYMO) program. AHYMO was developed particularly for the arid New Mexico region, and is accepted by agencies throughout New Mexico for use in hydrologic modeling, including the City of Albuquerque. Additional information regarding the hydrologic analysis and results are presented in Appendix A of this report.

The hydraulic analyses for the design options presented in this study were performed using the EPA Stormwater Management Model (SWMM), version 5.0.022. Hydrographs computed by the AHYMO computer program during the hydrologic analysis portion of this study were input into SWMM for the



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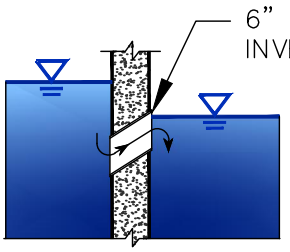

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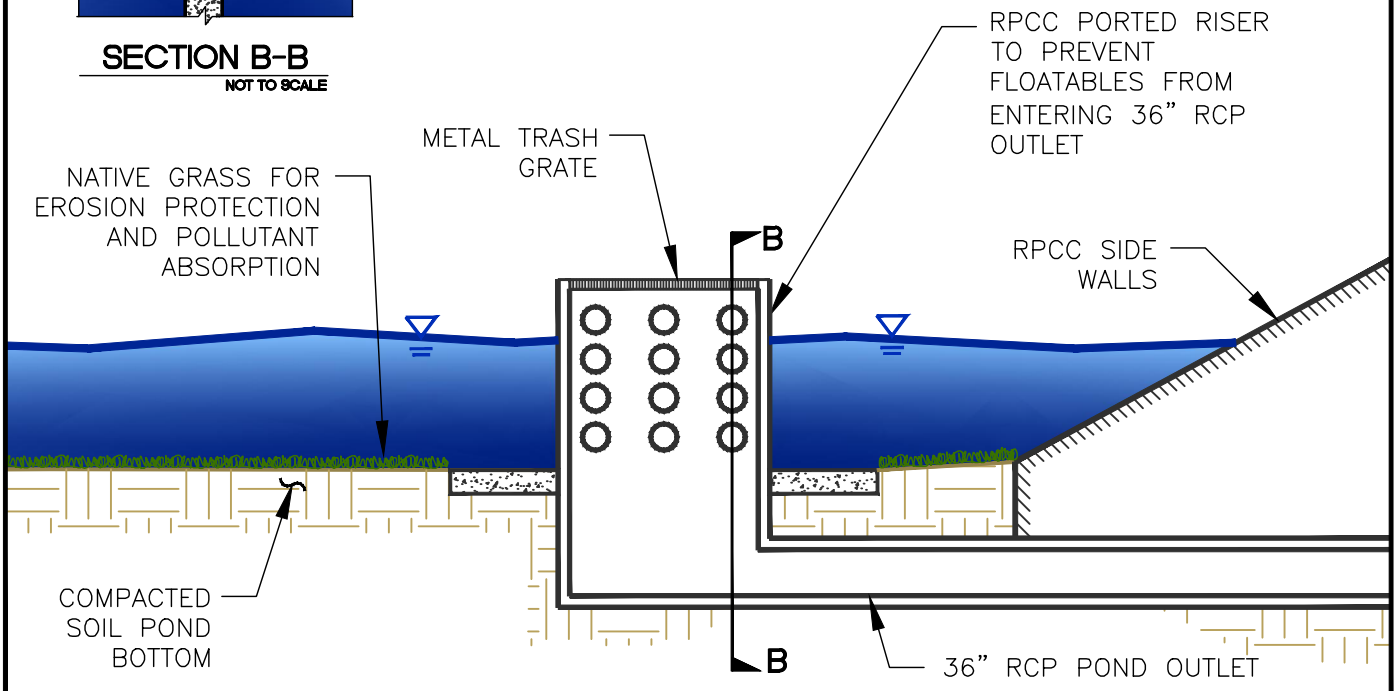

SECTION A-A
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AT LOMAS AND LOUISIANA

PORTED RISER SKETCH

PROJECT NO: 730491
DATE: AUGUST 2013
SHEET NO: EXHIBIT 3

hydraulic analyses. Information regarding the methodology and assumptions of the hydraulic analyses, as well as detailed results of the analyses, are presented in Appendix B of this report.

VII. DESIGN OPTIONS

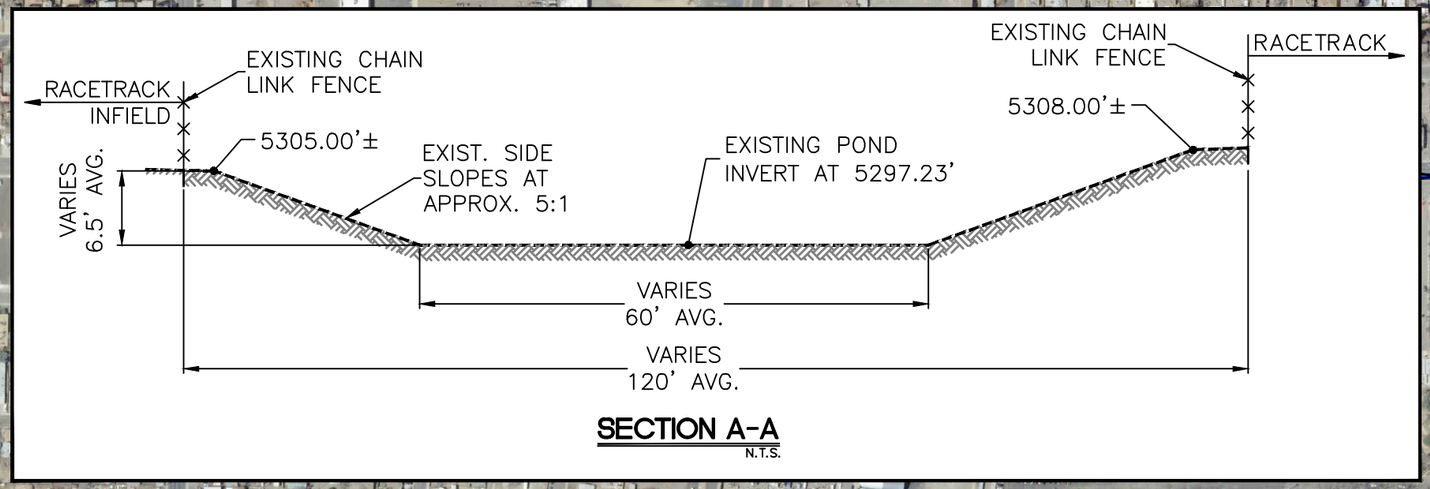
Existing System Overview

See Exhibit 4 for reference in the discussion of the existing conditions system overview and hydraulic analysis.

Storm water runoff from the off-site drainage basins east of the EXPO property and from the racetrack infield enters the Racetrack Detention Basin and is discharged through a 36" diameter RCP outlet. The 36" RCP outlet connects to an existing 48" RCP storm drain within the EXPO property. This 48" RCP system also receives off-site flow from Louisiana Boulevard near Gate 8 (south of Lomas Boulevard). No on-site flows are collected in the 48" RCP. The 48" RCP alignment is through the horse barn area; however, it does not collect any flows from the horse barn area as the existing inlets have been capped. The system discharges into the San Pedro North Pond. As stated in Section IV, EXPO On-Site Improvements, the CAFO retention pond east of the San Pedro North Pond will contain the runoff generated during a 25-year event. However, any runoff in excess of that event will spill into the San Pedro North Pond including, of course, the 100-year storm event. Storm water is also collected in the San Pedro Storm Drain both north of Lomas (from the drainage basin east of San Pedro) and south of Lomas (from EXPO on-site runoff). EXPO on-site runoff is also collected in the San Pedro South Pond. Flows in the San Pedro Storm Drain south of Lomas are split at the San Pedro South Pond: depending on downstream pipe capacity, some flows are diverted to the South Pond through a 6' tall by 8' wide box pipe, while some continue downstream in the San Pedro trunk line. This box pipe also serves as an outlet pipe from the South Pond as downstream capacity in the San Pedro system becomes available. Two 72" RCPs connect the North and South Ponds and equalize the water surface elevation in the two ponds. Storm water from the San Pedro North Pond is discharged through a 30" diameter outlet pipe connecting to the San Pedro Storm Drain. Flows collected in the San Pedro Storm Drain south of Lomas, the South Pond, and the North Pond are all conveyed through the San Pedro Storm Drain north to the Embudo Arroyo.

Results of the existing conditions model for the 100-year storm event reveal three key areas of concern: flooding from the Racetrack Detention Basin, flooding from the San Pedro South Pond, and surcharging of the San Pedro Storm Drain manholes north of Lomas Boulevard. Both the Racetrack Detention Basin and San Pedro South Pond overtop and manholes in San Pedro flood during the 100-year storm event. Summaries of occurrences at each location are provided below:

- Racetrack Detention Basin: Approximately 23.4 acre-feet of storm water overtops the Racetrack Detention Basin and about half of the racetrack infield is inundated. From the top of pond elevation of 5305.00' on the west, the racetrack infield slopes uphill to the west. The 100-year high water surface elevation in the racetrack infield reaches elevation 5307.50'±, storing a total of about 17.5 acre-feet of storm water in the infield above the top of the pond (see Table 1: Racetrack Detention Basin Existing



SECTION A-A
N.T.S.

EXISTING CONDITIONS

	CAPACITY (AC-FT)	TOP OF POND ELEVATION (FT)	100-YEAR WATER SURFACE ELEVATION (FT)	FLOODED VOLUME* (AC-FT)
RACETRACK DETENTION BASIN	11.5±	5305.00±	5307.50±**	23.4±
SAN PEDRO SOUTH POND	5.4±	5274.50±	5274.50±	2.0±
SAN PEDRO NORTH POND	7.8±	5277.00±	5274.56±	N/A

*VOLUME OF STORM WATER THAT OVERTOPS DETENTION BASIN / POND.

**AT ELEVATION 5307.50', STORM WATER WILL SPILL DOWN THE RACETRACK INFIELD WEST ACCESS TUNNEL AND INTO THE HORSE BARN AREA.

SAN PEDRO STORM DRAIN SYSTEM

SAN PEDRO NORTH POND

SAN PEDRO SOUTH POND

EXISTING CAFO RETENTION DAM

EXISTING 48" RCP

AREA CONTAINING CAPPED INLETS

APPROXIMATE 100-YEAR STORM INUNDATED AREA

EXISTING 36" RCP

RACETRACK DETENTION BASIN INV. = 5297.23

5307.50

5306.65

5305.00

EXISTING 48" RCP

LEGEND

- EXISTING STORM DRAIN
- DIRECTION OF FLOW
- EXISTING STORM MANHOLE

EXISTING CONDITIONS

SCALE: 1" = 400'

SEC JOB # 113108

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CITY OF ALBUQUERQUE
DEPARTMENT OF MUNICIPAL DEVELOPMENT
ENGINEERING DIVISION
Date: AUGUST-2013

TITLE:
DESIGN ANALYSIS REPORT FOR
STORM WATER QUALITY IMPROVEMENTS
AT LOMAS AND LOUISIANA
EXISTING CONDITIONS EXHIBIT

City Project No.	Zone Map No.	Drawing No.
730491	K-18	EXHIBIT 4

Conditions). At this elevation, there is a grade break at the vehicle access tunnel located in the northwest portion of the infield. From elevation 5307.50' the tunnel slopes downhill to the horse barn area. At a high water surface elevation of 5307.50', storm water will begin to spill down the access tunnel and into the horse barn area. In the existing conditions model, about 5.9 acre-feet (ac-ft) of storm water spills into the horse barn area. Once the storm water reaches the horse barn area, it will flow west through the horse barn area to the existing CAFO retention pond.

- San Pedro South Pond: Approximately 2.0 ac-ft of storm water overtops the San Pedro South Pond and flows west into the adjacent neighborhood.
- San Pedro Storm Drain: Approximately 0.9 ac-ft of storm water floods five manholes in San Pedro from between Lomas Boulevard and Summer Avenue (SP-18 through SP-15, and SP-13 shown on SWMM Map 1 located in Appendix B).

Table 1 –Racetrack Detention Basin Existing Conditions

Storage Location	From Elevation (ft)	To Elevation (ft)	Volume (ac-ft)
Racetrack Pond	5297.23	5305.00	11.5
Racetrack Infield	5305.00	5307.50	17.5
Horse Barn Area	5307.50	N/A	5.9

The design options proposed in this report are based on addressing storm water quality. By increasing the capacity of the Racetrack Detention Basin as proposed in each design option, the amount of storm water spilled into the horse barn area that would then commingle with CAFO water will eliminated. Increasing the capacity of the Racetrack Detention Basin will also improve the function of and relieve capacity issues in the San Pedro Storm Drain. A summary table comparing the reduction or increase in flooded volume at the three key areas of concern for each design option is provided below, and is followed by discussions of each design option.

Table 2 - Reduction (-) or Increase (+) in Flooded Volume at Selected Locations in Comparison to Existing Conditions

Design Option	CAFO/Horse Barn Area* (ac-ft)	Racetrack Infield* (ac-ft)	San Pedro South Pond (ac-ft)	San Pedro Manholes (ac-ft)
1	- 5.9	- 4.5	- 0.6	- 0.03
2	- 5.9	- 15.4	- 1.0	- 0.08
3	- 5.9	- 17.5	- 0.1	+ 3.00

*Racetrack Infield flooded volumes do not include the 5.9 ac-ft reduction in flooding of the CAFO/Horse Barn Area. To determine the total reduction in volume achieved at the Racetrack Detention Basin, sum the CAFO/Horse Barn Area and Racetrack Infield volumes.

Design Option 1

See Exhibit 5 for reference in the discussion of Design Option 1.

Design Option 1 consists of replacing the existing 5:1 (horizontal:vertical) earthen side slopes at the Racetrack Detention Basin with vertical walls made of reinforced cast-in-place concrete. The existing invert of 5297.23'± at the 36" RCP outlet will be maintained and the bottom of the pond will be regraded to increase the storage volume. The existing top of pond elevation may vary slightly but the pond footprint will generally match the existing area within the existing chain link fences. The use of vertical walls increases the pond capacity from 11.5 ac-ft to 22.6 ac-ft. A summary of the Design Option 1 SWMM results is provided below:

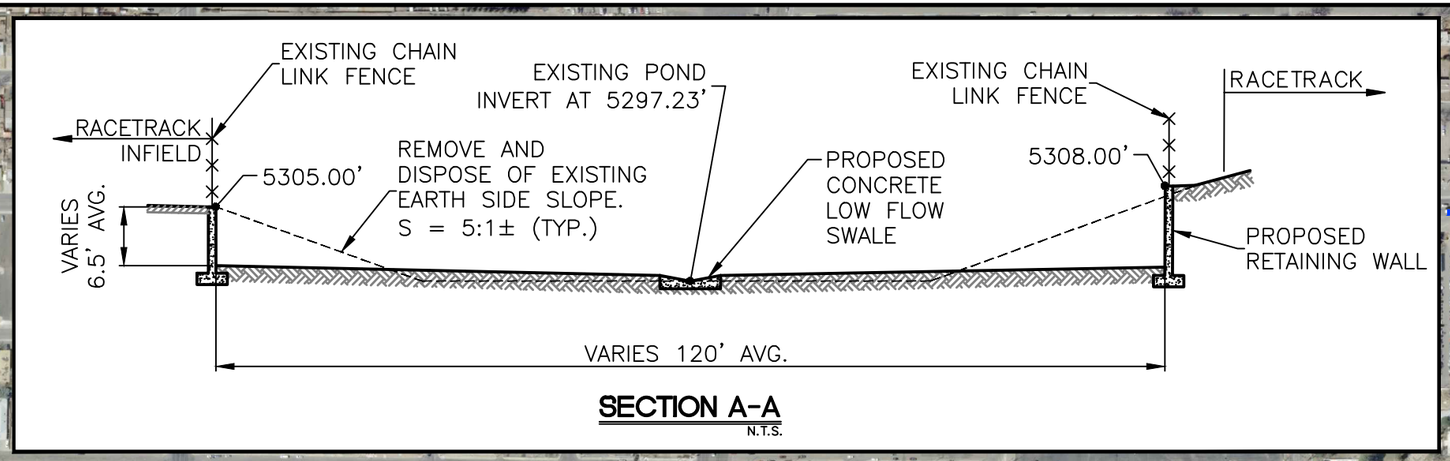
- Racetrack Detention Basin: The volume of the pond is increased from 11.5 ac-ft to 22.6 ac-ft which results in lowering the 100-year water surface elevation in the racetrack infield from 5307.50'± in current conditions to 5307.07'±. At this elevation, storm water is prevented from spilling down the west infield access tunnel and entering the horse barn area.
- San Pedro South Pond: Design Option 1 also reduces the amount of storm water that overtops the San Pedro South Pond by about 30 percent from existing conditions (from 2.0 ac-ft to 1.4 ac-ft).
- San Pedro Storm Drain: Manhole flooding in San Pedro is reduced from 0.90 ac-ft to 0.87 ac-ft. (Manholes SP-18 through SP-15, and SP-13 shown on SWMM Map 1 of 2 located in Appendix B are flooded.)

Design Option 1 reduces the 100-year high water surface elevation at the Racetrack Detention Basin to below the crest elevation of the west infield access tunnel, thereby preventing commingling of storm water from the Racetrack Detention Basin and runoff generated in the CAFO area. The prevention of commingling realized in Design Option 1, along with the proposed water quality features discussed in Section V, achieves the project goal of improving storm water quality. Design Option 1 is also advantageous in that all improvements are limited to the Racetrack Detention Basin and no new storm drain pipe is required. Design Option 1 approximately doubles the existing storage capacity within the Racetrack Detention Basin, eliminates flooding of the horse barn area, and reduces manhole flooding in the San Pedro system. For these reasons, Design Option 1 is the preferred design alternative.

Design Option 2

See Exhibit 6 for reference in the discussion of Design Option 2.

Design Option 2 includes the use of vertical walls at the Racetrack Detention Basin as discussed in Design Option 1 and the pond bottom will be lowered to increase the storage volume. The amount the pond can be lowered is controlled by an existing 18" sanitary sewer line crossing located approximately 20 feet west of the 36" RCP junction with the 48" RCP storm drain. Design Option 2 proposes reducing the clearance between the 36" RCP storm drain and 18" sewer line from about 3 feet of clearance to 1 foot of clearance. Lowering the 36" RCP any more than the proposed 2 feet at the crossing would require that the 36" storm drain be located under the sewer line. While possible, this approach would require that the re-laid 36" storm drain be placed 10 feet below the existing invert and this would result in significant



SECTION A-A

N.T.S.

DESIGN OPTION 1

BUILD VERTICAL SIDE WALLS AT RACETRACK DETENTION BASIN

	CAPACITY (AC-FT)	TOP OF POND ELEVATION (FT)	100-YEAR WATER SURFACE ELEVATION (FT)	FLOODED VOLUME* (AC-FT)
RACETRACK DETENTION BASIN	22.6±	5305.00±	5307.07±	13.0±
SAN PEDRO SOUTH POND	5.4±	5274.50±	5274.50±	1.4±
SAN PEDRO NORTH POND	7.8±	5277.00±	5274.55±	N/A

*VOLUME OF STORM WATER THAT OVERTOPS DETENTION BASIN / POND.

SAN PEDRO STORM DRAIN SYSTEM

SAN PEDRO NORTH POND

SAN PEDRO SOUTH POND

EXISTING CAFO RETENTION DAM

EXISTING 48" RCP TO REMAIN

AREA CONTAINING SEALED INLETS

APPROXIMATE 100-YEAR STORM INUNDATED AREA

EXISTING 36" RCP TO REMAIN

RACETRACK DETENTION BASIN INV. = 5297.23 (MATCH EXIST.)

5307.50

5307.07

5306.65

5305.00

A

A

EXISTING 48" RCP TO REMAIN

PROPOSED STORM WATER QUALITY FEATURE

LEGEND

- EXISTING STORM DRAIN
- DIRECTION OF FLOW
- (D) EXISTING STORM MANHOLE

DESIGN OPTION 1

SCALE: 1" = 400'

SEC JOB # 113108

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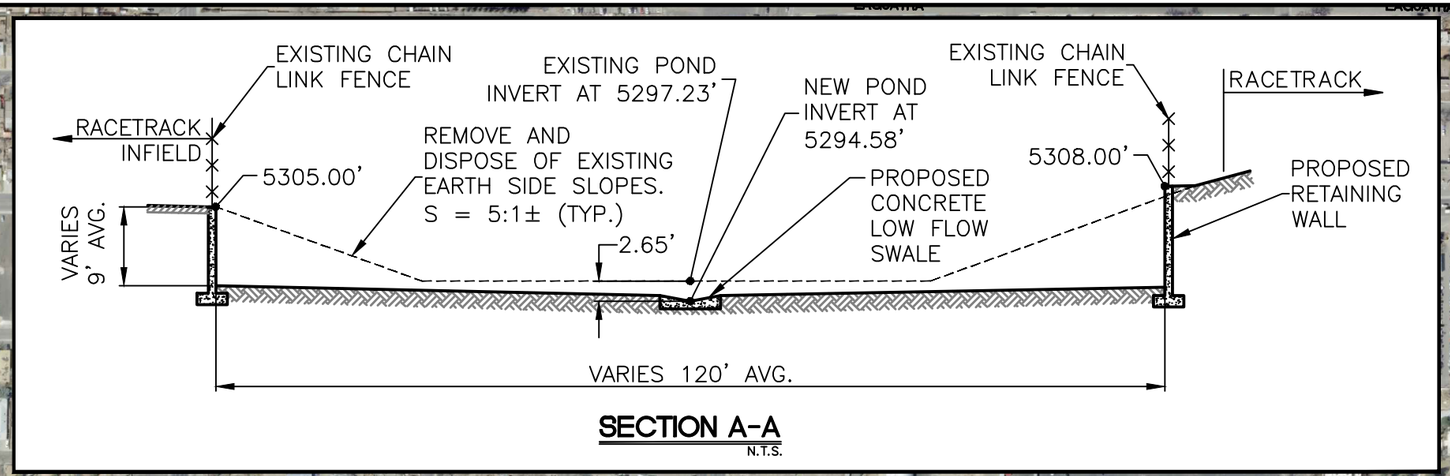
CITY OF ALBUQUERQUE
DEPARTMENT OF MUNICIPAL DEVELOPMENT
ENGINEERING DIVISION
Date: AUGUST-2013

TITLE: DESIGN ANALYSIS REPORT FOR STORM WATER QUALITY IMPROVEMENTS AT LOMAS AND LOUISIANA

DESIGN OPTION 1 EXHIBIT

City Project No.	Zone Map No.	Drawing No.
730491	K-18	EXHIBIT 5



SECTION A-A

N.T.S.

DESIGN OPTION 2

LOWER INVERT AND BUILD VERTICAL SIDE WALLS AT RACETRACK DETENTION BASIN

	CAPACITY (AC-FT)	TOP OF POND ELEVATION (FT)	100-YEAR WATER SURFACE ELEVATION (FT)	FLOODED VOLUME* (AC-FT)
RACETRACK DETENTION BASIN	33.6±	5305.00±	5305.49±	2.1±
SAN PEDRO SOUTH POND	5.4±	5274.50±	5274.50±	1.0±
SAN PEDRO NORTH POND	7.8±	5277.00±	5274.55±	N/A

*VOLUME OF STORM WATER THAT OVERTOPS DETENTION BASIN / POND.

LEGEND

- EXISTING STORM DRAIN
- DIRECTION OF FLOW
- EXISTING STORM MANHOLE
- NEW STORM DRAIN
- NEW STORM MANHOLE
- ABANDONED STORM DRAIN
- ABANDONED STORM MANHOLE

DESIGN OPTION 2

SCALE: 1" = 400'

SEC JOB # 113108

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AT LOMAS AND LOUISIANA

DESIGN OPTION 2 EXHIBIT

City Project No.	Zone Map No.	Drawing No.
730491	K-18	EXHIBIT 6

increases in construction costs. Therefore, the re-laid depth is limited to the 2 foot lowering as described above. From the new invert at the sewer line crossing, a new 36" RCP will be placed back to the Racetrack Detention Basin at a slope of 0.005 ft/ft. The slope of the existing 36" storm drain is 0.006 ft/ft. The decrease in slope will provide an additional 0.65' of depth in the Racetrack Detention Basin resulting in a total allowable decrease in the pond invert elevation of 2.65'. Boring under the racetrack will be required to relay the 36" pipe and the existing 36" pipe will be abandoned in place. The lowering of the pipe will also require a portion (about 500 linear feet) of the existing 48" RCP in the horse barn area to be re-laid at a flatter slope.

Design Option 2 modifications to the Racetrack Detention Basin result in a pond storage capacity of 33.6 ac-ft. A SWMM results summary of the three key system elements for Design Option 2 is provided below:

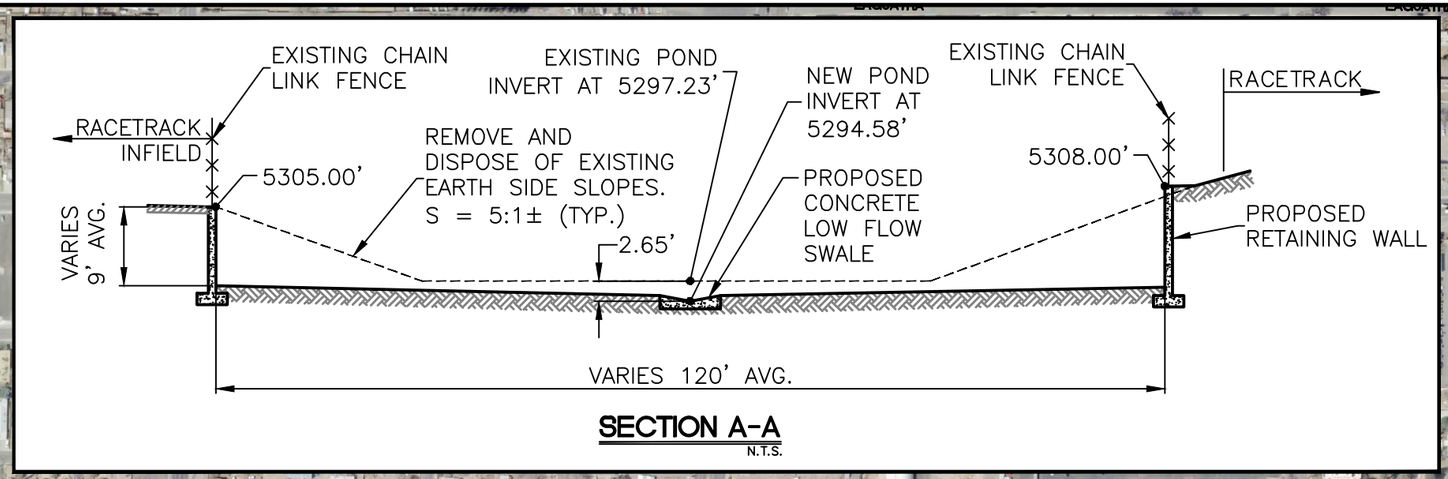
- Racetrack Detention Basin: The volume of the pond is increased from 11.5 ac-ft (in existing conditions) to 33.6 ac-ft resulting in a volume of 2.1 ac-ft overtopping the Racetrack Detention Basin in the 100-year storm event, reaching a high water surface elevation of 5305.49±. Design Option 2 reduces the water surface elevation by 2.01' from existing conditions and 1.58' from Design Option 1.
- San Pedro South Pond: The volume of storm water overtopping the San Pedro South Pond in Design Option 2 is reduced from 2.0 ac-ft in existing conditions and 1.4 ac-ft in Design Option 1 to 1.02 ac-ft.
- San Pedro Storm Drain: The volume of storm water flooding manholes in San Pedro is reduced from 0.90 ac-ft in existing conditions and 0.87 ac-ft in Design Option 1 to 0.82 ac-ft in Design Option 2. Manholes SP-17 through SP-15 are flooded (shown on SWMM Map 1 located in Appendix B).

Design Option 2 achieves the project goal of eliminating flooding from the Racetrack Detention Basin into the horse barn area. Design Option 2 also reduces flooding of the San Pedro South Pond and San Pedro Storm Drain. These reductions in flooding are only incremental when compared to Design Option 1, and while desirable, do not directly address the primary project goal. Design Option 1 achieves the primary project goal at approximately half the cost of Design Option 2 (see Section VIII, Construction Costs). Design Option 2 is therefore not the recommended design alternative.

Design Option 3

See Exhibit 7 for reference in the discussion of Design Option 3.

Design Option 3 includes use of the Racetrack Detention Basin modifications proposed in Design Option 2. Design Option 3 does not include the new 36" Racetrack Detention Basin outlet pipe and adjoining 48" RCP within the horse barn area as discussed in Design Option 2. Instead, a new storm drain will be built in Louisiana and Lomas Boulevards and will convey storm water around the Expo property rather than through it. The existing 36" RCP Racetrack Detention Basin outlet will be plugged, and the existing 48" RCP through the EXPO property will be abandoned. A new 48" RCP outlet will be built at the northern end of the pond and will direct flows east into Louisiana Boulevard. A 42" metering plate



SECTION A-A

N.T.S.

DESIGN OPTION 3

LOWER INVERT AND BUILD VERTICAL SIDE WALLS AT RACETRACK DETENTION BASIN; BUILD NEW STORM DRAIN IN LOUISIANA AND LOMAS BLVDS.

	CAPACITY (AC-FT)	TOP OF POND ELEVATION (FT)	100-YEAR WATER SURFACE ELEVATION (FT)	FLOODED VOLUME* (AC-FT)
RACETRACK DETENTION BASIN	33.6±	5305.00±	5304.97±	NA
SAN PEDRO SOUTH POND	5.4±	5274.50±	5274.50±	0.1±
SAN PEDRO NORTH POND	7.8±	5277.00±	5274.51±	N/A

*VOLUME OF STORM WATER THAT OVERTOPS DETENTION BASIN / POND.

DESIGN OPTION 3

SCALE: 1" = 400'

SEC JOB # 113108

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CITY OF ALBUQUERQUE
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STORM WATER QUALITY IMPROVEMENTS
AT LOMAS AND LOUISIANA
DESIGN OPTION 3 EXHIBIT

City Project No.	Zone Map No.	Drawing No.
730491	K-18	EXHIBIT 7

will be placed on the 48" RCP outlet. The purpose of using a 48" pipe with metered flow is to allow for greater pipe capacity in the future if downstream conditions in the San Pedro system are improved to allow for increased outflow from the Racetrack Basin. The remainder of the new 48" RCP storm drain will proceed north in Louisiana Boulevard to Lomas Boulevard, then turn west toward San Pedro Drive, where it will tie into the existing San Pedro system at the intersection of Lomas Boulevard and San Pedro Drive. Approximately 4,200 linear feet of pipe will be required for Option 3. A SWMM results summary of the three key system elements for Design Option 3 is provided below:

- Racetrack Detention Basin: The high water surface elevation at the Racetrack Detention Basin for Design Option 3 is 5304.97±. At this elevation, the Racetrack Detention Basin will not overtop.
- San Pedro South Pond: Since Design Option 3 routes the Racetrack Detention Basin outflow around the EXPO property, the San Pedro North and South Ponds receive no inflow from the Racetrack Basin. The reduced inflow into the San Pedro Ponds greatly reduces overtopping at the San Pedro South Detention Basin to 0.1 ac-ft.
- San Pedro Storm Drain: The routing of the Racetrack Detention Basin flows directly into the San Pedro Storm Drain worsens the manhole flooding north of Lomas. Manhole flooding increases from 0.9 ac-ft in existing conditions to 3.0 ac-ft in Design Option 3. This can be explained by the larger outlet pipe at the Racetrack Detention Basin, and the addition of an inflow location along the San Pedro Storm Drain. Manholes SP-19 through SP-11 (from Lomas Boulevard to Constitution Avenue) shown on SWMM Map 2 located in Appendix B.

While Design Option 3 eliminates flooding of the racetrack infield and reduces flooding at the San Pedro South Pond, flooding of the San Pedro system north of Lomas is increased. As with Design Option 2, Design Option 3 does not provide added benefits to improve storm water quality when compared to Design Option 1. Design Option 3 also worsens an existing condition in the San Pedro Storm Drain. Additionally, there are some constructability concerns with this design option. The new storm drain in Louisiana and Lomas Boulevards will reach depths of approximately 25 feet in some areas. The lane closures required to accommodate trenching for the new storm drain will impact traffic and increase construction costs significantly. Estimated construction costs for Design Option 3 are more than three times the estimated cost of Design Option 1, and almost twice the estimated cost of Design Option 2 (see Section VIII, Construction Costs). Design Option 3 is not recommended due to these significantly increased costs when compared to the less expensive design options and levels of benefit with respect to the project goal.

VIII. CONSTRUCTION COSTS

Detailed construction cost estimates were developed for all three design options using the City of Albuquerque City Engineer's Estimated Unit Prices for Contract Items 2009 and were supplemented by data from recent contractor's bids on COA projects. Each of the cost estimates include a 20% contingency, allowances for utility relocation and testing, and tax at 7%. A summary of estimated

construction costs for each option are provided below. The detailed construction cost estimates are presented in Appendix C.

Option 1: The estimated construction cost for Option 1 is $ 2,073,419. All construction costs relative to Option 1 are located in the Racetrack Detention Basin. The bid items contributing to the majority of the estimated construction cost for Option 1 are the removal and disposal of excess excavation, construction of new reinforced concrete retaining walls and the placement of concrete flatwork within the pond.

Option 2: The estimated construction cost for Option 2 is $ 3,882,622**.** The additional cost for Option 2 when compared to Option 1 can be found in the removal and disposal of the additional 2.65 feet of excavated earthen material from within the Racetrack Detention Basin and the increased size of the reinforced concrete retaining wall around the inside of the detention pond. Approximately 725 linear feet of 36" RCP and 500 linear feet of 48" RCP will also need to be removed and replaced to accommodate the new pond invert.

Option 3: The estimated construction cost for Option 3 is $ 6,546,298**.** The additional cost for Option 3 when compared to Option 2 is for the installation of approximately 4,200 linear feet of 48" RCP in Louisiana Boulevard and Lomas Boulevard from the Racetrack Detention Pond to San Pedro Drive. The removal, disposal and replacement of the arterial pavement and other roadway items in Louisiana and Lomas add significant cost to Option 3 when compared to Option 1 and Option 2.

IX. CONCLUSION

After evaluating all three options based on the project goal, Design Option 1 is recommended. Design Option 1 will improve storm water quality by eliminating flooding of the CAFO area from off-site flows and by permanently sealing all existing inlets within the CAFO area. This complete separation of CAFO and MS4 water and incorporation of the storm water quality features proposed in Section V will help to reduce pollutants in COA storm water. Design Option 1 limits improvements to the Racetrack Pond and utilizes existing infrastructure to the maximum extent possible. Concentrating all construction to the Racetrack Detention Basin may result in an accelerated construction schedule and favorable bidding.

If Design Option 1 is an acceptable alternative to the EPA Region 6 for improving storm water quality the City proposes to move forward with the design and ultimately the construction of the improvements as identified in this report. The City anticipates that design could start as soon as Fall 2013 with construction beginning in late 2014.

APPENDICES

APPENDIX A

Hydrologic Analysis

APPENDIX A CONTENTS

HYDROLOGIC ANALYSIS

Methodology and Assumptions

There has been several drainage studies conducted for the project area over the past 20 years. Several of these studies have resulted in the construction of new storm drain facilities in and around the study area. This includes the recent construction of the water quality feature by EXPO New Mexico for the CAFO water generated in the horse barn area. The scope of this project included review of those studies and the constructed improvements to determine the impact of these on the flows that will reach the storm drain system that is being studied. Additionally, this study updates hydrology for basins that contribute to the system and the results of this hydrology effort support the hydraulic analysis of the system and the proposed options for improving the system.

The hydrologic analysis for this study was performed according to the criteria and methodology from the COA Development Process Manual, Volume 2, Chapter 22. The 100-year, 24-hour event is used as the design storm as the project includes several detention basins. Rainfall data for the 100-year storm was obtained from the National Oceanic and Atmospheric Administration (NOAA) Precipitation Frequency Data Server, NOAA Atlas 14 Point Precipitation Frequency Estimates. Cumulative rainfall depths used for the 100-year, 24- hour storm are provided in Table A1 below.

Table A1 – Cumulative Rainfall Depths

Time (hours)	100-Year Cumulative Rainfall Depth (inches)
0.25	0.00
1	1.84
6	2.37
24	2.78

Direct runoff hydrographs were computed using the Arid Lands Hydrologic Model (AHYMO) program. AHYMO was developed particularly for the arid New Mexico region, and is accepted by agencies throughout New Mexico for use in hydrologic modeling, including the City of Albuquerque. Each drainage basin analyzed was divided into several sub-basins. The time to peak (t_p) for each sub-basin was computed using the NRCS Upland Method for sub-basin lengths less than 4,000 feet. Flow paths were assumed to follow existing streets. The flow path for each sub-basin was divided into as many as five reaches due to varying slopes and changes in direction of flow. A minimum time to peak of 0.133 hours was used for computed times to peak less than 0.133 hours.

To determine the flow intercepted from within the study area by existing storm drain systems both pipe and drop inlet capacities were evaluated. Pipe sizes and slopes were obtained from record drawings and used in Manning's equation to compute total pipe capacity. Estimates for available pipe capacities within the study area were developed through review of past drainage studies and size of upstream drainage

basins contributing to each pipe. An average capacity of 5 cubic feet per second (cfs) was assumed to be collected by drop inlets. The average drop inlet capacity of 5 cfs was multiplied by the total number of drop inlets along each interceptor pipe to determine the total interception capacity. This product was then compared to the available pipe capacity. The lower of the two numbers is the control and represents the flow intercepted and removed from the drainage basin.

Study Area Basin Characteristics

The study area is approximately 1.22 square miles and is fully developed. Significant changes to the land use within the study area are not expected. Land uses and treatments were determined from aerial photography. Please see the AHYMO Basin Parameter Worksheet at the end of this narrative for a summary of basin land treatments, as well as times to peak, times of concentration, hydraulic lengths, peak flowrates, and runoff volumes for each drainage basin. Please also see Exhibit A1: Drainage Basin Map for reference in the following discussion of the study area drainage basins.

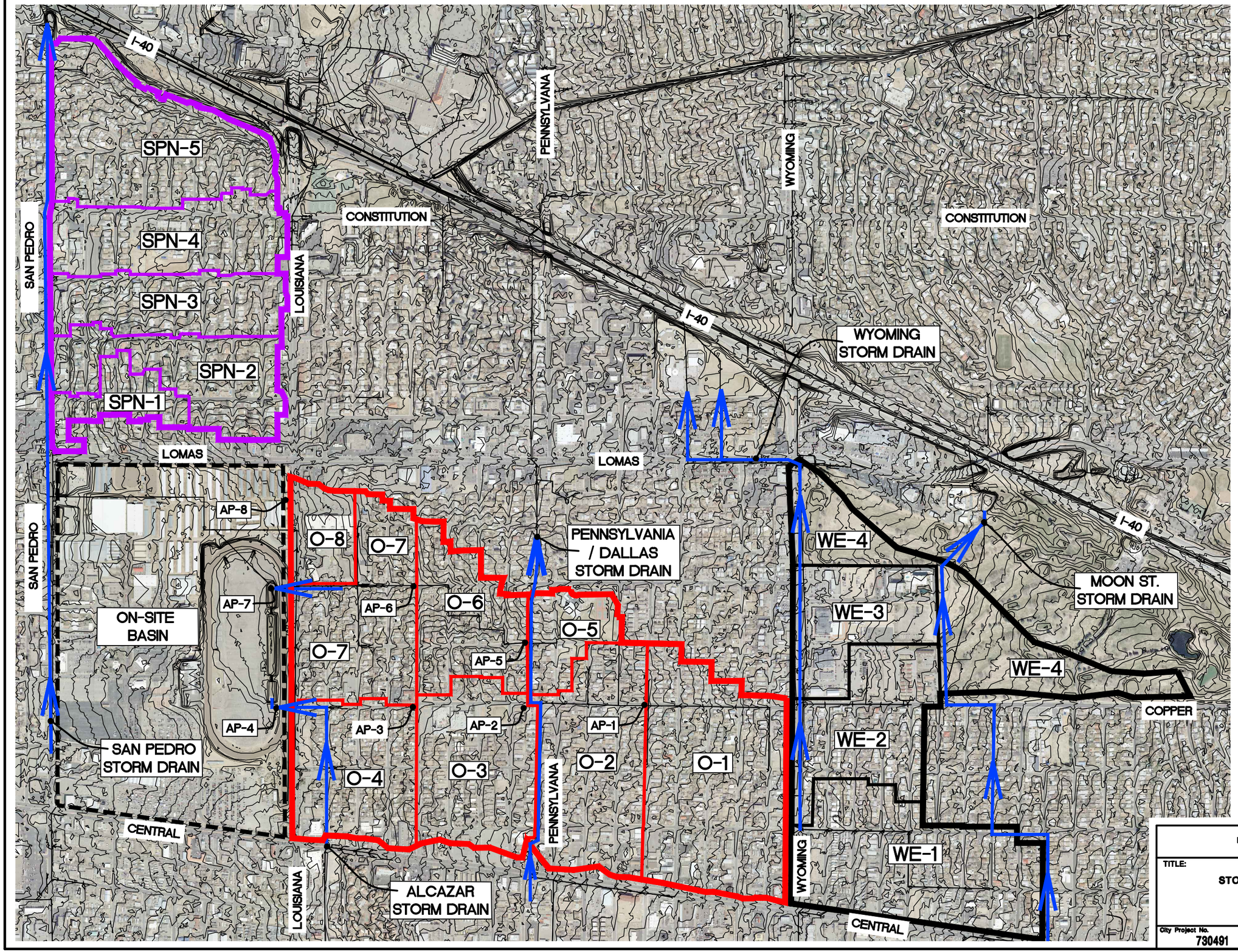
For purposes of this hydrologic analysis, the study area has been divided into four major drainage basins: one on-site drainage basin, and three off-site drainage basins. The on-site drainage basin includes the area bounded by Lomas Boulevard on the north, Central Avenue on the south, Louisiana Boulevard on the east, and San Pedro Drive on the west. The first off-site drainage basin includes a portion of the drainage area east of Wyoming Boulevard between Central Avenue and Lomas Boulevard. The second off-site drainage basin extends west from Wyoming Boulevard to Louisiana Boulevard also between Central Avenue and Lomas Boulevard. The third off-site drainage basin extends east from San Pedro Drive to Louisiana Boulevard and north from Lomas Boulevard to Interstate 40.

Additionally, one off-site drainage basin located south of the study area impacts the EXPO system. This basin was analyzed in the *Campus Wash Drainage Basin* report (Smith Engineering Company, 2008). The hydrologic analysis for this basin was obtained from the referenced report and applied to this study.

Within the study area, overland flow generally travels west until it is intercepted by a storm drain system. Slopes in the east to west direction average about 2% (range from 1 to 3%) and slopes in the south to north direction average about 1%.

Wyoming East Off-Site Basin

As noted above, the Wyoming East Basin (Basin WE) consists of 0.34 square miles of land east of Wyoming Boulevard between Central Avenue and Lomas Boulevard. Basin WE is divided into five sub-basins and includes a mixture of commercial, residential, and recreational (parks/golf courses) land uses. Information presented in the *Design Analysis Report for Moon Street Storm Drain Project* (Bohannan-Huston, Inc., 2006) was used to help determine the basin boundary. Based on review of the Moon Street design analysis report and record drawings it was determined that runoff generated east of the Moon Street storm drain will be wholly intercepted by the Moon Street system. Therefore, the horizontal alignment of the Moon Street system serves as the eastern boundary of Basin WE between Copper and Central Avenues. North of Copper Avenue, Basin WE includes a triangular-shaped portion that extends from the intersection of Lomas and Wyoming Boulevard in the northwest corner to Mankin Street in the



ANALYSIS POINT	Q(100) (24hr.) (cfs)	V(100) (24hr.) (Ac.ft)
1	185	11.0724
2	269	17.7510
3	205	9.9821
4	518	31.5040
5	49	1.9995
6	127	6.1152
7	225	11.8662
8	67	3.3177

NOTES:

1. WE– BASINS WERE DEVELOPED SOLELY FOR THE PURPOSE OF DETERMINING BY–PASS STORM WATER FLOW CROSSING WYOMING BLVD. AND ENTERING THE O–BASIN DRAINAGE AREA AND ULTIMATELY INTO THE STATE FAIR RACE TRACK DETENTION POND.
2. SPN– BASINS WERE DEVELOPED SOLELY FOR THE PURPOSE OF DETERMINING STORM WATER FLOW IMPACTING THE SAN PEDRO STORM DRAIN SYSTEM BETWEEN LOMAS BLVD. AND INTERSTATE 40.
3. ON–SITE BASIN ANALYZED IN "STORM DRAIN INVESTIGATION REPORT FOR SAN PEDRO BOULEVARD AND THE NEW MEXICO STATE FAIRGROUNDS" (SMITH ENGINEERING COMPANY, 1995)
4. FOR CLARITY, EXISTING DRAINAGE INFRASTRUCTURE WITHIN EXPO NM ON–SITE BASIN IS NOT SHOWN. SEE EXHIBIT 4 FOR EXISTING ON–SITE INFRASTRUCTURE.

LEGEND

- WYOMING EAST BASIN BOUNDARY
- SUB–BASIN BOUNDARY
- LOUISIANA EAST BASIN BOUNDARY
- SUB–BASIN BOUNDARY
- SAN PEDRO NORTH BASIN BOUNDARY
- SUB–BASIN BOUNDARY
- EXPO NM ON–SITE BASIN BOUNDARY
- STORM DRAIN W/FLOW DIRECTION
- O-1 DRAINAGE SUB–BASIN DESIGNATION
- AP-1 DRAINAGE ANALYSIS POINT

SCALE: 1" = 500'

500' 0 500' 1000' 1500'Feet

SEC JOB # 113108

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DRAINAGE BASIN MAP

City Project No.	Zone Map No.	Drawing No.
730491	K-18	EXHIBIT A1

southeast corner (approximately 1200 feet south of the intersection of Copper Avenue and Eubank Boulevard).

The peak runoff flow generated in Basin WE is approximately 473 cfs (average of 2.16 cfs per acre). A majority of this runoff is intercepted by the Wyoming Storm Drain, but due to limited inlet capacities some runoff continues to sheet flow west across Wyoming Boulevard. An estimated 85 cfs will bypass the Wyoming Storm Drain and will enter the Louisiana Off-Site Basin.

Louisiana East Off-Site Basin

The Louisiana East Off-Site Basin (Basin O) is directly west of Basin WE with Wyoming Boulevard serving as its eastern boundary. The basin extends west to Louisiana Boulevard and is bounded on the south by Central Avenue. The northern boundary of Basin O determined from topographic contours begins at Copper Avenue on the east end and extends to Lomas Boulevard on the west end. Basin O is divided into eight sub-basins and contains mostly residential land use with some commercial and recreational land uses.

Bypassed flows from Basin WE enter Basin O at Chico Road and Copper Avenue, and are routed through sub-basin O-1. Runoff generated in the Basin O sub-basins is routed through various streets to analysis points as described in the AHYMO input file and as shown on Exhibit A1.

Within Basin O the Pennsylvania Avenue/Dallas Street and Alcazar Street Storm Drains are of importance. At Copper Avenue, the Dallas Street storm drain goes from a 36" diameter reinforced concrete pipe (RCP) to a 66" diameter RCP, increasing the storm drain capacity. To determine the interception capacity of the system the 36" and 66" pipe capacities were evaluated and compared to the inlet capacity for each pipe. As shown in Table A2 the Pennsylvania/Dallas system is able to intercept 116 cfs.

Table A2 –Flows Intercepted by Pennsylvania/Dallas Storm Drain (Louisiana East Basin)

Pipe Size (in.)	Pipe Slope (ft/ft)	Pipe Capacity (cfs)	Number of Inlets	Inlet Capacity (cfs)	Interception Capacity (cfs)
36	0.0130	76	22	110	76
66	0.0063	267	8	40	40
				TOTAL	**116**

The Alcazar storm drain at the southwest corner of Basin O conveys runoff from the Campus Wash drainage basin into the racetrack detention pond. According to the *Campus Wash Drainage Basin* report (Smith Engineering Company, 2008), the Alcazar storm drain conveys a peak flow of 412 cfs into the racetrack detention pond. Based on inlet capacities, 150 cfs is collected in the Alcazar storm drain from sub-basins O-3 and O-4. The remaining 262 cfs enters the storm drain south of Central from runoff generated in the Campus Wash Drainage Basin.

The majority of the flows from Basin O reach the racetrack pond through the 90" RCP in Copper Avenue or through the 66" RCP at Marquette. The remainder of the flows from Basin O reaches the 48" RCP EXPO storm drain at Gate 8 (on Louisiana south of Lomas).

On-Site Basin

The on-site hydrologic model from the 1995 *Storm Drain Investigation Report for San Pedro Boulevard and the New Mexico State Fairgrounds* (prepared by Smith Engineering Company) was used for the on-site hydrology for this study. Please refer to this report for information regarding the on-site basin characteristics and hydrologic analysis results. Three modifications were made to the original hydrologic model to reflect changes in the existing conditions that have occurred since publication of the 1995 report:

1. The rainfall data in the original AHYMO input file was for the 100-year, 6-hour storm, and was obtained from NOAA Atlas 2, which has since been replaced with NOAA Atlas 14. The rainfall data in the original AHYMO input file was replaced with the new NOAA Atlas 14 rainfall data for the 100-year, 24-hour storm used for this study (shown in Table 1 of this hydrologic analysis narrative). The model was run with the updated rainfall depths which produced new runoff amounts for all on-site basins.

2. Second, the original model was adjusted to reflect the impacts of the recently constructed CAFO Retention Dam at the northwest corner of the EXPO property affecting only Basin 100. The dam is designed to contain runoff from the 25-year storm event in Basin 100, which corresponds to 80 percent of the 100-year storm event (COA DPM, Volume II, Chapter 22). Therefore, 80 percent of the runoff generated in Basin 100 for the 100-year storm event will be contained by the EXPO dam and not enter the COA drainage system while the remaining 20 percent will overtop the dam and spill into the San Pedro North Detention Basin. To represent this in AHYMO 80 percent of the Basin 100 hydrograph (hydrograph number 106.1) is divided out, and the hydrograph of the remaining 20 percent entering the North Pond is used in the hydraulic analysis.

3. Finally, the land treatment of Basin 700, consisting of the racetrack infield, has changed since the 1995 report. The compacted soil parking lot within the racetrack infield has been resurfaced with asphalt millings converting Type C land treatment to Type D land treatment.

This study maintains the same assumptions presented in the 1995 report regarding the flows intercepted by the San Pedro Storm Drain from Domingo Road to Lomas Boulevard. Hydrograph identification numbers for these flows from the 1995 report used in this study are shown on the SWMM Maps provided in Appendix B.

San Pedro North Off-Site Basin

It was necessary to also analyze the San Pedro North Off-Site Basin (Basin SPN) to determine the downstream hydraulic conditions of the San Pedro Storm Drain and its effects on the upstream systems. Basin SPN is divided into five sub-basins, and consists mostly of residential land use. As with the other off-site basins, the San Pedro North Basin's interception capacity was evaluated based on the Manning's full flow capacity of the storm drain main line and the number of inlets within each sub-basin. Runoff

from SPN-1, 2, 3, 4 and part of SPN-5 (from Lomas to Hannett Avenue) is collected by a 54" diameter RCP main line. At an average slope of 0.006 ft/ft (according to the Central Heights Storm Sewer record drawings), the 54" RCP provides a full flow capacity of about 150 cfs. North of Hannett Avenue the pipe diameter increases to 60" at a slope of about 0.01 ft/ft, increasing the full flow capacity to about 260 cfs. After comparing these capacities to the number of drop inlets in the basin, it was determined that the number of inlets controls the intercepted runoff in all of Basin SPN. Table 3 on the following page summarizes the Basin SPN flows intercepted by the San Pedro system.

As shown in Table 3, a total of 5.8 acre-feet (ac-ft) of storm water generated in Basin SPN is *not* collected by the San Pedro Storm Drain. Some of this runoff will pond in San Pedro until capacity becomes available, while the rest will continue west into the adjacent neighborhood. Building more drop inlets to increase storm water collection is not recommended as only 15 cfs of non-pressure capacity remains in the existing 54" RCP to convey flows from both the EXPO system *and* the San Pedro Storm Drain south of Lomas.

Table 3 –San Pedro North Basin Intercepted Flows

Sub-Basin	Peak Flow (cfs)	Number of Inlets	Interception Capacity (cfs)	Bypassed Flow (cfs)	Bypassed Volume (ac-ft)
SPN-1	42	7	35	7	0.0456
SPN-2	88	4	20	68	1.9223
SPN-3	71	4	20	51	1.4152
SPN-4	86	4	20	66	1.9591
SPN-5	114	15	75[1]	39	0.3887
		TOTAL	**170**	**231**	**5.8009**

[1]35 cfs in sub-basin SPN-5 is collected south of Hannett Avenue, by the 54" RCP, totaling 135 cfs collected by the 54" diameter RCP. The remaining 40 cfs is collected north of Hannett Avenue by the 60" diameter RCP.

This concludes the hydrologic analysis for this study. Please see the remainder of this appendix as well as the referenced reports for additional information supporting the hydrologic analysis.

AHYMO Basin Parameter Worksheet

LOUISIANA AND LOMAS STORM DRAIN IMPROVEMENTS
RACETRACK DETENTION BASIN OFF-SITE HYDROLOGY

AHYMO BASIN PARAMETER WORKSHEET
PEAK BASIN FLOWS AND VOLUMES

EXISTING CONDITIONS - FULLY DEVELOPED

													100 YEAR	
BASIN	AREA (sq.mi.)	LENGTH (ft.)	ELEV. DIFF. (ft.)	SLOPE (%)	K	VEL (fps)	T(c) (hr.)	T(p) (hr.)	LAND TREATMENT (%) A	B	C	D	PEAK FLOW (24hr.) (cfs)	RUNOFF VOLUME (24hr.) (ac.ft.)
WE-1	0.1192	300	4.0	1.33	1.0	1.15	0.07	0.05						
		400	3.0	0.75	3.0	2.60	0.04	0.03						
		1,200	18.0	1.50	3.0	3.67	0.09	0.06						
		600	2.0	0.33	3.0	1.73	0.10	0.06						
		1,200	16.0	1.33	3.0	3.46	0.10	0.06						
	TOTAL =						0.40	0.27	20	20	30	30	140	8.1903
WE-2	0.0721	150	2.0	1.33	1.0	1.15	0.04	0.02						
		1,050	10.0	0.95	3.0	2.93	0.10	0.07						
		1,200	12.0	1.00	3.0	3.00	0.11	0.07						
	TOTAL =						0.25	0.16	15	15	10	60	139	6.8893
WE-3	0.0593	400	4.0	1.00	1.0	1.00	0.11	0.07						
		300	4.0	1.33	2.0	2.31	0.04	0.02						
		1,000	13.0	1.30	3.0	3.42	0.08	0.05						
		400	2.0	0.50	3.0	2.12	0.05	0.03						
	TOTAL =						0.28	0.19	0	10	0	90	131	7.4242
WE-4	0.0919	400	5.0	1.25	0.7	0.78	0.14	0.09						
		2,300	34.0	1.48	3.0	3.65	0.18	0.12						
		650	4.0	0.62	3.0	2.35	0.08	0.05						
		1,500	19.0	1.27	3.0	3.38	0.12	0.08						
		1,100	6.0	0.55	3.0	2.22	0.14	0.09						
	TOTAL =						0.66	0.44	10	50	33	7	59	4.4555

LOUISIANA AND LOMAS STORM DRAIN IMPROVEMENTS
RACETRACK DETENTION BASIN OFF-SITE HYDROLOGY

AHYMO BASIN PARAMETER WORKSHEET
PEAK BASIN FLOWS AND VOLUMES

EXISTING CONDITIONS - FULLY DEVELOPED

													100 YEAR	
BASIN	AREA (sq.mi.)	LENGTH (ft.)	ELEV. DIFF. (ft.)	SLOPE (%)	K	VEL (fps)	T(c) (hr.)	T(p) (hr.)	LAND TREATMENT (%) A	B	C	D	PEAK FLOW (24hr.) (cfs)	RUNOFF VOLUME (24hr.) (ac.ft.)
O-1	0.1363	200	2.0	1.00	1.0	1.00	0.06	0.04						
		200	2.0	1.00	1.0	1.00	0.06	0.04						
		1,900	10.0	0.53	3.0	2.18	0.24	0.16						
		1,325	22.0	1.66	3.0	3.87	0.10	0.06						
	TOTAL =						0.45	0.30	20	20	30	30	148	9.3652
O-2	0.0972	277	4.0	1.44	1.0	1.20	0.06	0.04						
		537	1.0	0.19	3.0	1.29	0.12	0.08						
		338	6.0	1.78	3.0	4.00	0.02	0.02						
		1,315	12.0	0.91	3.0	2.87	0.13	0.08						
		663	5.0	0.75	3.0	2.61	0.07	0.05						
	TOTAL =						0.40	0.27	20	20	30	30	114	6.6787
O-3	0.0803	150	2.0	1.33	1.0	1.15	0.04	0.02						
		300	2.0	0.67	3.0	2.45	0.03	0.02						
		1,000	10.0	1.00	3.0	3.00	0.09	0.06						
		1,325	8.0	0.60	3.0	2.33	0.16	0.11						
	TOTAL =						0.32	0.21	20	20	30	30	110	5.5174
O-4	0.0733	400	5.0	1.25	1.0	1.12	0.10	0.07						
		600	2.0	0.33	3.0	1.73	0.10	0.06						
		1,000	13.0	1.30	3.0	3.42	0.08	0.05						
		675	2.0	0.30	3.0	1.63	0.11	0.08						
	TOTAL =						0.39	0.26	20	20	30	30	87	5.0365

LOUISIANA AND LOMAS STORM DRAIN IMPROVEMENTS
RACETRACK DETENTION BASIN OFF-SITE HYDROLOGY

AHYMO BASIN PARAMETER WORKSHEET
PEAK BASIN FLOWS AND VOLUMES

EXISTING CONDITIONS - FULLY DEVELOPED

													100 YEAR	
BASIN	AREA (sq.mi.)	LENGTH (ft.)	ELEV. DIFF. (ft.)	SLOPE (%)	K	VEL (fps)	T(c) (hr.)	T(p) (hr.)	LAND TREATMENT (%) A	B	C	D	PEAK FLOW (24hr.) (cfs)	RUNOFF VOLUME (24hr.) (ac.ft.)
O-5	0.0291	401	2.0	0.50	1.0	0.71	0.16	0.11						
		970	16.0	1.65	3.0	3.85	0.07	0.05						
	TOTAL =						0.23	0.15	20	20	30	30	49	1.9995
O-6	0.0599	550	6.0	1.09	2.0	2.09	0.07	0.05						
		1,800	16.0	0.89	3.0	2.83	0.18	0.12						
	TOTAL =						0.25	0.17	20	20	30	30	94	4.1158
O-7	0.0837	150	1.0	0.67	1.0	0.82	0.05	0.03						
		250	3.0	1.20	2.0	2.19	0.03	0.02						
		1,100	11.0	1.00	3.0	3.00	0.10	0.07						
		1,050	9.0	0.86	3.0	2.78	0.11	0.07						
	TOTAL =						0.29	0.19	20	20	30	30	123	5.7511
O-8	0.0265	400	4.0	1.00	1.0	1.00	0.11	0.07						
		250	3.0	1.20	2.0	2.19	0.03	0.02						
		550	3.0	0.55	3.0	2.22	0.07	0.05						
	TOTAL =						0.21	0.14	0	10	0	90	67	3.3177
SPN-1	0.0240	300	3.0	1.00	1.0	1.00	0.08	0.06						
		100	1.0	1.00	1.0	1.00	0.03	0.02						
		1,210	26.0	2.15	3.0	4.40	0.08	0.05						
	TOTAL =						0.19	0.13	20	40	10	30	42	1.5821

LOUISIANA AND LOMAS STORM DRAIN IMPROVEMENTS
RACETRACK DETENTION BASIN OFF-SITE HYDROLOGY

AHYMO BASIN PARAMETER WORKSHEET
PEAK BASIN FLOWS AND VOLUMES

EXISTING CONDITIONS - FULLY DEVELOPED

													100 YEAR	
BASIN	AREA (sq.mi.)	LENGTH (ft.)	ELEV. DIFF. (ft.)	SLOPE (%)	K	VEL (fps)	T(c) (hr.)	T(p) (hr.)	LAND TREATMENT (%) A	B	C	D	PEAK FLOW (24hr.) (cfs)	RUNOFF VOLUME (24hr.) (ac.ft.)
SPN-2	0.0695	400	9.0	2.25	1.0	1.50	0.07	0.05						
		715	8.0	1.12	3.0	3.17	0.06	0.04						
		2,300	28.0	1.22	3.0	3.31	0.19	0.13						
	TOTAL =						0.33	0.22	20	40	10	30	88	4.5815
SPN-3	0.0593	400	3.0	0.75	1.0	0.87	0.13	0.09						
		225	3.0	1.33	3.0	3.46	0.02	0.01						
		2,350	25.0	1.06	3.0	3.09	0.21	0.14						
	TOTAL =						0.36	0.24	20	40	10	30	71	3.9091
SPN-4	0.0716	400	3.0	0.75	1.0	0.87	0.13	0.09						
		220	2.0	0.91	3.0	2.86	0.02	0.01						
		2,300	24.0	1.04	3.0	3.06	0.21	0.14						
	TOTAL =						0.36	0.24	20	40	10	30	86	4.7199
SPN-5	0.0651	400	5.0	1.25	1.0	1.12	0.10	0.07						
		850	8.0	0.94	3.0	2.91	0.08	0.05						
	TOTAL =						0.18	0.12	20	40	10	30	114	4.2928

AHYMO Input File

```
START
*
*S   THIS HYDROLOGIC MODEL HAS BEEN DEVELOPED TO DETRMINE OFF-SITE FLOWS
*S   IMPACTING THE STATE FAIR RACE TRACK POND.  BASED ON THE MOST RECENT
*S   CITY OF ALBUQUERQUE MAPPING, THE CONTRUBUTING BASIN IS 100% DEVELOPED.
*S
*S DATE:  jUNE 13, 2013
*S
*S FILENAME - input         :  OFF100.IN
*S FILENAME - output        :  OFF100.OUT
*S FILENAME - summary table :  OFF100.SUM
*S
*S PROJECT TITLE: LOUISIANA AND LOMAS STROM DRAIN IMPROVEMENTS
*S
*S SEC PROJECT NUMBER: 113108
*S CONSULTANT: SMITH ENGINEERING COMPANY
*S CLIENT: CITY OF ALBUQUERQUE
*S ASSUMPTIONS: LAND TREATMENTS ARE PER C.O.A. DPM CHAPTER 22
*S
*S ---------------------------------------------------------------
*S        100-YR, 24 HOUR STORM EVENT
*S ---------------------------------------------------------------
*
RAINFALL             TYPE=2  RAIN QUARTER=0.0
                     RAIN ONE=1.84 IN   RAIN SIX=2.37 IN
                     RAIN DAY=2.78 IN   DT=0.05 HR
*
*
*S
*S    %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
*S    FIRST, LET US LOOK AT HOW MUCH FLOW EAST OF WYOMING BLVD. WILL
*S    WILL BE IMPACTING THE OFF-SITE BASINS BETWEEN WYOMING AND LOUISIANA
*S    %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
*
*
*S    BASIN WE-1
*
*
*S    TOTAL FLOW AT WYOMING AND CHICO
*
COMPUTE NM HYD       ID=33   HYD=WE-1  DA=0.1192 SQ MI
                     PER A=20 PER B=20 PER C=30 PER D=30
                     TP=0.27 HR MASS RAIN=-1
*
PRINT HYD            ID=33   CODE=1
*
*
*S    THE EXISTING STORM DRAIN IN WYOMING BLVD. WILL INTERCEPT 68 CFS
*S    OF THE FLOW FROM WE-1 AND CARRY IT NORTH TO COPPER ROAD.
*S    THE REMAINING FLOW (HYD WE-1WEST, ID=35) WILL ENTER BASIN O-1.
*
*
*
DIVIDE HYD           ID=33  Q=68   ID=34  HYD NO=WE-1NORTH
                                   ID=35  HYD NO=WE-1WEST
*
PRINT HYD            ID=34  CODE=1
PRINT HYD            ID=35  CODE=1
*
*
*S    ROUTE WE-1NORTH IN THE WYOMING STORM DRAIN FROM CHICO TO COPPER
*
COMPUTE RATING CURVE CID=1   VS NO=1   CODE=-1  SLP=.0.0045
                     DIA=5.50 FT  N=0.013
*
ROUTE MCUNGE         ID=2  HYD NO=WE-1NORTHR  INFLOW ID=34
                     DT=0.0  L = 1400
                     NS=0  SLOPE=0.0045  MATCODE=0
                     REGCODE=0  CCODE=0
*
PRINT HYD            ID=2 CODE=1
*
*
*S    BASIN WE-2
*
*
*S    PARTIAL FLOW AT WYOMING AND COPPER (FLOWING IN COPPER FROM THE EAST)
*
COMPUTE NM HYD       ID=43   HYD=WE-2  DA=0.0721 SQ MI
```

```
                    PER A=15 PER B=15 PER C=10 PER D=60
                    TP=0.16 HR MASS RAIN=-1
*
PRINT HYD           ID=43   CODE=1
*
*
*S    ADD ROUTED FLOW FROM WE-1NORTHR AND BASIN WE-2
*
*S    TOTAL FLOW AT WYOMING AND COPPER
*
ADD HYD             ID=10  HYD=WYO&COPP  ID I=2  ID II=43
*
PRINT HYD           ID=10  CODE=1
*
*
*S    THE EXISTING STORM DRAIN IN WYOMING BLVD. WILL INTERCEPT 177 CFS
*S    OF THE FLOW AT WYOMING AND COPPER AND CARRY IT NORTH TO LOMAS BLVD.
*S    THE REMAINING FLOW (WE-2WEST ID=45) WILL ENTER BASIN O-1.
*
*
DIVIDE HYD          ID=10  Q=177  ID=44  HYD NO=WE-2NORTH
                                  ID=45  HYD NO=WE-2WEST
*
PRINT HYD           ID=44  CODE=1
PRINT HYD           ID=45  CODE=1
*
*
*S    ROUTE WE-2NORTH IN THE WYOMING STORM DRAIN FROM COPPER TO
*S    SOUTH BOUNDARY OF LOS ALTOS GOLF COURSE ALONG WYOMING
*
COMPUTE RATING CURVE CID=1   VS NO=1   CODE=-1  SLP=.0.0081
                    DIA=7.0 FT  N=0.013
*
ROUTE MCUNGE        ID=2  HYD NO=WE-2NORTHR  INFLOW ID=44
                    DT=0.0  L = 1400
                    NS=0  SLOPE=0.0081  MATCODE=0
                    REGCODE=0  CCODE=0
*
PRINT HYD           ID=2 CODE=1
*
*
*S    BASIN WE-3
*
*S    PARTIAL FLOW AT WYOMING AND SOUTH EDGE OF LOS ALTOS GOLF COURSE
*
COMPUTE NM HYD      ID=53   HYD=WE-3  DA=0.0593 SQ MI
                    PER A=0 PER B=10 PER C=0 PER D=90
                    TP=0.19 HR MASS RAIN=-1
*
PRINT HYD           ID=53   CODE=1
*
*
*S    ADD ROUTED FLOW FROM WE-2NORTH AND BASIN WE-3
*
*S    TOTAL FLOWS AT WYOMING AND SOUTH EDGE OF LOS ALTOS GOLF COURSE
*
ADD HYD             ID=10  HYD=WYO&SELAGC  ID I=2  ID II=53
*
PRINT HYD           ID=10  CODE=1
*
*
*S    THE EXISTING STORM DRAIN IN WYOMING BLVD. WILL INTERCEPT 205 CFS
*S    OF THE FLOW FROM WYOMING AND THE SOUTH EDGE OF LOS ALTOS GOLF COURSE
*S    AMD CARRY IT NORTH TO LOMAS BLVD. ALL EXCESS FLOW NOT ENTERING THE
*S    WYOMING STORM DRAIN WILL FLOW IN THE WYOMING BLVD. STREET SECTION
*S    TO LOMAS BLVD.
*
*
DIVIDE HYD          ID=10  Q=205  ID=54  HYD NO=WE-3NORTH1
                                  ID=55  HYD NO=WE-3NORTH2
*
PRINT HYD           ID=54  CODE=1
PRINT HYD           ID=55  CODE=1
*
*
*S    BASIN WE-4
*
*
*S    FLOW FROM THE LOS ALTOS GOLF COURSE IMPACTING WYOMING BLVD.
```

```
*
COMPUTE NM HYD       ID=63   HYD=WE-4  DA=0.0919 SQ MI
                     PER A=10 PER B=50 PER C=33 PER D=7
                     TP=0.44 HR MASS RAIN=-1
*
PRINT HYD            ID=63   CODE=1
*
*
*S    THE FLOW FROM WE-4 WILL DRAIN TO WYOMING AND REMAIN IN THE
*S    STREET AS THE STORM DRAIN LINE IN WYOMING IS FULL
*
*
*S    ADD FLOW FROM WE-3NORTH2 AND BASIN WE-4
*
*S    TOTAL FLOWS IN WYOMING AT LOMAS (NOT INCLUDING STORM DRAIN FLOW)
*
ADD HYD              ID=70  HYD=WYO&LOMAS  ID I=55  ID II=63
*
PRINT HYD            ID=70  CODE=1
*
*
*S    %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
*S    THIS SECTION WILL ROUTE AND ADD BASIN FLOWS
*S    INTO THE RACETRACK POND AT COPPER AND LOUISIANA
*S    THROUGH THE EXISTING 90" RCP
*S    %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
*
*
*S    FIRST WE MUST ROUTE THE BY-PASS FLOW FROM WYOMING AND CHICO
*S    (WE-1WEST) THROUGH BASIN O-1 TO AP-1
*
COMPUTE RATING CURVE CID=1   VS NO=1   NO SEGS=1
                         MIN ELEV=0.0 FT   MAX ELEV=1.75 FT
                         CH SLP=0.0100     FP SLP=0.0100
                         N=0.02  DIST=153.26
                         DIST    ELEV       DIST    ELEV    DIST    ELEV
                         0.00    1.75       50.00   0.75    54.00   0.67
                         54.46   0.67       54.63   0.00    56.63   0.13
                         76.63   0.53       96.63   0.13    98.63   0.00
                         98.80   0.67       99.26   0.67   103.26   0.75
                         153.26  1.75
*
COMPUTE TRAVEL TIME  ID=2 REACH NO=1 NO VS=1 L=2900 FT
                     SLP=0.0100
ROUTE                ID=2  HYD NO=WE-1WESTR INFLOW ID=35 DT=0.0
PRINT HYD            ID=2 CODE=1
*
*
*S    SECOND WE MUST ROUTE THE BY-BASS FLOW FROM WYOMING AND COPPER
*S    (WE-2WEST) THROUGH BASIN O-1 TO AP-1
*
COMPUTE RATING CURVE CID=1   VS NO=1   NO SEGS=1
                         MIN ELEV=0.0 FT   MAX ELEV=1.75 FT
                         CH SLP=0.0150     FP SLP=0.0150
                         N=0.02  DIST=153.26
                         DIST    ELEV       DIST    ELEV    DIST    ELEV
                         0.00    1.75       50.00   0.75    54.00   0.67
                         54.46   0.67       54.63   0.00    56.63   0.13
                         76.63   0.53       96.63   0.13    98.63   0.00
                         98.80   0.67       99.26   0.67   103.26   0.75
                         153.26  1.75
*
COMPUTE TRAVEL TIME  ID=12 REACH NO=1 NO VS=1 L=1600 FT
                     SLP=0.0085
ROUTE                ID=12  HYD NO=WE-2WESTR INFLOW ID=45 DT=0.0
PRINT HYD            ID=12 CODE=1
*
*
*S    ADD BASINS WE-1WESTR AND WE-2WESTR AT AP-1
*
*S    PARTIAL FLOW TO AP-1
*
ADD HYD              ID=10  HYD=PARTAP-1  ID I=2  ID II=12
PRINT HYD            ID=10  CODE=1
*
*
*S    BASIN O-1
*
*S    PARTIAL FLOW AT AP-1
```

```
*
COMPUTE NM HYD       ID=3   HYD=O-1  DA=0.1363 SQ MI
                     PER A=20 PER B=20 PER C=30 PER D=30
                     TP=0.30 HR MASS RAIN=-1
*
PRINT HYD            ID=3   CODE=1
*
*
*S    ADD BASINS WE-1WESTR AND WE-2WESTR TO O-1 AT AP-1
*
*S    TOTAL FLOW TO AP-1
*
ADD HYD              ID=20  HYD=AP-1  ID I=10  ID II=3
PRINT HYD            ID=20  CODE=1
*
*
*S    ROUTE FLOW FROM AP-1 DOWN COPPER AVE. THRU BASIN O-2 TO AP-2
*
COMPUTE RATING CURVE CID=1   VS NO=1   NO SEGS=1
                         MIN ELEV=0.0 FT   MAX ELEV=1.75 FT
                         CH SLP=0.0085     FP SLP=0.0085
                         N=0.02  DIST=153.26
                         DIST    ELEV       DIST    ELEV    DIST    ELEV
                         0.00    1.75       50.00   0.75    54.00   0.67
                         54.46   0.67       54.63   0.00    56.63   0.13
                         76.63   0.53       96.63   0.13    98.63   0.00
                         98.80   0.67       99.26   0.67   103.26   0.75
                         153.26  1.75
*
COMPUTE TRAVEL TIME  ID=2 REACH NO=1 NO VS=1 L=1300 FT
                     SLP=0.0085
ROUTE                ID=2  HYD NO=AP-1R INFLOW ID=20 DT=0.0
PRINT HYD            ID=2 CODE=1
*
*
*S    BASIN O-2
*
COMPUTE NM HYD       ID=3   HYD=O-2   DA=0.0972 SQ MI
                     PER A=20 PER B=20 PER C=30 PER D=30
                     TP=0.27 HR MASS RAIN=-1
*
PRINT HYD            ID=3   CODE=1
*
*
*S    ADD BASINS O-1 AND O-2 AT AP-2
*
*S    TOTAL FLOWS TO AP-2
*
ADD HYD              ID=20  HYD=AP-2  ID I=2  ID II=3
PRINT HYD            ID=20  CODE=1
*
*
*S    116 CFS AT AP-2 WILL BE INTERCEPTED BY THE DALLAS STORM DRAIN SYSTEM
*S    AND TAKEN NORTH TO THE I-40 CHANNEL
*
DIVIDE HYD           ID=20  Q=116  ID=66  HYD NO=DALSD
                                   ID=10  HYD NO=REVAP-2
*
PRINT HYD            ID=66  CODE=1
PRINT HYD            ID=10  CODE=1
*
*
*S    ROUTE FLOW FROM REVAP-2 DOWN COPPER AVE. THRU BASIN O-3 TO AP-3
*
COMPUTE RATING CURVE CID=1   VS NO=1   NO SEGS=1
                         MIN ELEV=0.0 FT   MAX ELEV=1.75 FT
                         CH SLP=0.0092     FP SLP=0.0092
                         N=0.02  DIST=141.26
                         DIST    ELEV       DIST    ELEV    DIST    ELEV
                         0.00    1.75       50.00   0.75    54.00   0.67
                         54.46   0.67       54.63   0.00    56.63   0.13
                         70.63   0.41       84.63   0.13    86.63   0.00
                         86.80   0.67       87.26   0.67    91.26   0.75
                         141.26  1.75
*
COMPUTE TRAVEL TIME  ID=2 REACH NO=1 NO VS=1 L=1200 FT
                     SLP=0.0092
ROUTE                ID=2  HYD NO=AP-2R INFLOW ID=10 DT=0.0
PRINT HYD            ID=2 CODE=1
```

```
*
*
*S    BASIN O-3
*
COMPUTE NM HYD       ID=3  HYD=O-3   DA=0.0803 SQ MI
                     PER A=20 PER B=20 PER C=30 PER D=30
                     TP=0.21 HR MASS RAIN=-1
*
PRINT HYD            ID=3   CODE=1
*
*
*S    ADD FLOWS FROM AP-2 AND BASIN O-3
*
*S    TOTAL FLOW AT AP-3
*
ADD HYD              ID=10  HYD=AP-3  ID I=2  ID II=3
PRINT HYD            ID=10 CODE=1
*
*
*S    ROUTE FLOW FROM AP-3 DOWN COPPER AVE. THRU BASIN O-4 TO AP-4
*
COMPUTE RATING CURVE CID=1   VS NO=1   NO SEGS=1
                         MIN ELEV=0.0 FT   MAX ELEV=1.75 FT
                         CH SLP=0.0108     FP SLP=0.0108
                         N=0.02  DIST=141.26
                         DIST    ELEV       DIST    ELEV    DIST    ELEV
                         0.00    1.75       50.00   0.75    54.00   0.67
                         54.46   0.67       54.63   0.00    56.63   0.13
                         70.63   0.41       84.63   0.13    86.63   0.00
                         86.80   0.67       87.26   0.67    91.26   0.75
                         141.26  1.75
*
COMPUTE TRAVEL TIME  ID=2 REACH NO=1 NO VS=1 L=1300 FT
                     SLP=0.0108
ROUTE                ID=2  HYD NO=AP-3R INFLOW ID=10 DT=0.0
PRINT HYD            ID=2 CODE=1
*
*
*S    BASIN o-4
*
COMPUTE NM HYD       ID=3   HYD=O-4   DA=0.0733 SQ MI
                     PER A=20 PER B=20 PER C=30 PER D=30
                     TP=0.26 HR MASS RAIN=-1
*
PRINT HYD            ID=3   CODE=1
*
*
*S    ADD FLOWS FROM AP-3 AND BASIN O-4
*
*S    PARTIAL FLOW AT AP-4
*
ADD HYD              ID=10 HYD=PARTAP-4  ID I=2 ID II=3
PRINT HYD            ID=10 CODE=1
*
*
*S    RECALLING HYDROGRAPH FROM CAMPUS WASH DRAINAGE STUDY - FLOW FROM
*S    ALCAZAR STORM DRAIN ENTERS BASIN O-4 FROM THE SOUTH AND WILL EVENTUALLY
*S    REACH AP-4
*
RECALL HYD          ID=99  HYD=218.I
                    DT=  .050000 HRS   DA=    .4187 SQ MI
                    PEAK=    412.000CFS  RO= 2.1237 INCHES  NO PTS=529
                    FLOW RATES
                           .000       .000       .000       .000       .000
                           .000       .000       .000       .000       .000
                           .000       .000       .000       .142      1.307
                          3.822      6.693      9.200     11.751     15.040
                         19.008     22.962     25.054     25.990     30.572
                         44.466     64.915     93.134    147.857    202.659
                        235.027    260.083    303.976    361.569    412.000
                        409.038    403.377    395.472    386.041    376.142
                        366.643    356.324    341.498    327.551    304.085
                        283.839    271.263    261.669    253.234    243.082
                        229.697    224.167    218.619    215.368    202.720
                        183.118    161.241    138.088    114.803     92.693
                         72.789     56.197     46.152     42.063     36.732
                         32.081     27.944     24.843     22.791     21.089
                         19.589     18.249     17.026     15.918     14.923
                         14.031     13.225     12.500     11.845     11.259
```

off100

10.746	10.280	9.839	9.441	9.102
8.941	8.814	8.681	8.574	8.492
8.409	8.329	8.255	8.193	8.142
8.103	8.059	8.021	8.009	7.991
7.966	7.939	7.931	7.936	7.940
7.947	7.945	7.941	7.949	7.974
8.007	8.034	8.065	8.100	8.130
8.155	8.191	8.233	8.264	8.299
8.345	8.373	8.291	8.111	7.956
7.822	7.638	7.414	7.183	6.962
6.780	6.644	6.547	6.476	6.422
6.374	6.322	6.274	6.237	6.206
6.173	6.142	6.110	6.074	6.057
6.042	6.015	5.987	5.960	5.937
5.902	5.872	5.861	5.850	5.822
5.796	5.771	5.753	5.738	5.713
5.702	5.692	5.664	5.636	5.610
5.590	5.576	5.565	5.551	5.540
5.530	5.506	5.484	5.476	5.455
5.436	5.417	5.402	5.386	5.364
5.358	5.351	5.328	5.302	5.281
5.260	5.242	5.230	5.222	5.216
5.206	5.192	5.164	5.144	5.140
5.125	5.107	5.092	5.082	5.067
5.058	5.047	5.022	5.011	5.003
4.981	4.958	4.942	4.930	4.920
4.910	4.902	4.893	4.879	4.870
4.859	4.837	4.816	4.810	4.794
4.779	4.779	4.768	4.754	4.737
4.715	4.708	4.703	4.679	4.671
4.663	4.648	4.634	4.623	4.629
4.630	4.613	4.593	4.573	4.542
4.522	4.522	4.524	4.518	4.508
4.488	4.471	4.471	4.464	4.449
4.433	4.422	4.414	4.402	4.390
4.384	4.376	4.371	4.363	4.345
4.325	4.324	4.322	4.308	4.294
4.282	4.270	4.259	4.246	4.237
4.230	4.223	4.211	4.202	4.197
4.195	4.177	4.160	4.159	4.162
4.149	4.130	4.112	4.104	4.108
4.101	4.089	4.072	4.066	4.056
4.038	4.036	4.035	4.018	4.012
4.005	3.993	3.993	3.993	3.975
3.964	3.953	3.944	3.934	3.922
3.911	3.902	3.895	3.889	3.886
3.883	3.882	3.880	3.876	3.865
3.842	3.827	3.828	3.820	3.804
3.801	3.791	3.779	3.782	3.775
3.764	3.754	3.747	3.741	3.741
3.735	3.730	3.721	3.697	3.692
3.692	3.680	3.679	3.676	3.661
3.648	3.650	3.650	3.639	3.626
3.613	3.603	3.594	3.591	3.590
3.603	3.605	3.576	3.549	3.546
3.550	3.549	3.545	3.541	3.539
3.537	3.520	3.505	3.503	3.503
3.485	3.474	3.478	3.467	3.456
3.462	3.455	3.443	3.432	3.427
3.419	3.415	3.410	3.407	3.400
3.396	3.389	3.388	3.381	3.364
3.366	3.363	3.352	3.351	3.353
3.338	3.320	3.325	3.329	3.313
3.299	3.293	3.300	3.303	3.294
3.281	3.273	3.265	3.264	3.259
3.253	3.245	3.237	3.230	3.224
3.221	3.218	3.218	3.221	3.208
3.195	3.197	3.192	3.182	3.161
3.148	3.157	3.167	3.157	3.148
3.153	3.145	3.132	3.132	3.124
3.120	3.128	3.120	3.108	3.098
3.092	3.085	3.083	3.077	3.073
3.072	3.069	3.064	3.067	3.061
3.044	3.040	3.039	3.024	3.025
3.023	3.012	3.013	3.017	3.003
2.992	2.999	3.005	2.992	2.973
2.965	2.975	2.980	2.969	2.956
2.948	2.945	2.941	2.935	2.931
2.927	2.920	2.911	2.904	2.905

```
                                                  off100
                          2.906      2.905      2.900      2.895      2.892
                          2.896      2.877      2.696      2.398      2.139
                          1.926      1.683      1.396      1.106       .854
                           .653       .509       .404       .331       .277
                           .233       .201       .176       .155       .138
                           .122       .106       .092       .082       .073
                           .065       .057       .051       .045       .041
                           .036       .032       .028       .026       .022
                           .020       .018       .016       .014       .012
                           .011       .010       .008       .008       .005
                           .005       .004       .002       .002
*
PRINT HYD             ID=99  CODE=1

*
*
*S    REMOVE 150 CFS FROM THE ALCAZAR STORM DRAIN DUE TO THE FACT BASINS
*S    O-3 & O-4 GENERATE FLOW THAT WILL FILL THE ALCAZAR STROM DRAIN WITH
*S    150 CFS. WITH THAT SAID, ONLY 262 CFS OF THE RECALLED HYDROGRAPH
*S    WILL ENTER BASIN O-4.
*
*
DIVIDE HYD            ID=99  Q=150  ID=98  HYD NO=CENTRAL
                                    ID=97  HYD NO=ALCAZAR
*
PRINT HYD             ID=98  CODE=1
PRINT HYD             ID=97  CODE=1
*
*
*
*S    ADD FLOWS FROM THE ALCAZAR STORM DRAIN AND BASIN O-4
*
*S    TOTAL FLOW AT AP-4 & TOTAL FLOWS INTO SOUTH END OF RACE TRACK POND
*S    THROUGH THE EXISTING 90" RCP
*
ADD HYD               ID=20 HYD=AP-4  ID I=10 ID II=97
PRINT HYD             ID=20 CODE=1
*
*
*
*
*S    %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
*S        THIS SECTION WILL ROUTE AND ADD BASIN FLOWS
*S        INTO THE RACETRACK POND AT MARQUETTE AND LOUISIANA
*S        THROUGH THE EXISTING 66" RCP
*S    %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
*
*
*S    BASIN O-5
*
*S    TOTAL FLOW AT AP-5
*
COMPUTE NM HYD        ID=3   HYD=O-5&AP-5  DA=0.0291 SQ MI
                      PER A=20 PER B=20 PER C=30 PER D=30
                      TP=0.15 HR MASS RAIN=-1
*
PRINT HYD             ID=3   CODE=1
*
*
*S    ROUTE FLOW BASIN O-5 FROM AP-5 DOWN VARIOUS STREETS THRU BASIN O-6
*S    TO AP-6
*
COMPUTE RATING CURVE CID=1   VS NO=1   NO SEGS=1
                         MIN ELEV=0.0 FT   MAX ELEV=1.75 FT
                         CH SLP=0.0089     FP SLP=0.0089
                         N=0.02  DIST=141.26
                         DIST    ELEV       DIST    ELEV    DIST    ELEV
                         0.00    1.75       50.00   0.75    54.00   0.67
                         54.46   0.67       54.63   0.00    56.63   0.13
                         70.63   0.41       84.63   0.13    86.63   0.00
                         86.80   0.67       87.26   0.67    91.26   0.75
                         141.26  1.75
*
COMPUTE TRAVEL TIME   ID=2 REACH NO=1 NO VS=1 L=1800 FT
                      SLP=0.0089
ROUTE                 ID=2  HYD NO=AP-5R INFLOW ID=3 DT=0.0
PRINT HYD             ID=2 CODE=1
*
*
```

```
*S    BASIN O-6
*
COMPUTE NM HYD       ID=3   HYD=O-6   DA=0.0599 SQ MI
                     PER A=20 PER B=20 PER C=30 PER D=30
                     TP=0.17 HR MASS RAIN=-1
*
PRINT HYD            ID=3   CODE=1
*
*
*S    ADD BASINS O-5 AND O-6 AT AP-6
*
*S    TOTAL FLOWS TO AP-6
*
ADD HYD              ID=10  HYD=AP-6  ID I=2  ID II=3
PRINT HYD            ID=10  CODE=1
*
*
*S    ROUTE FLOW FROM AP-6 DOWN MARQUETTE AVE. THRU BASIN O-7 TO AP-7
*
COMPUTE RATING CURVE CID=1   VS NO=1   NO SEGS=1
                         MIN ELEV=0.0 FT   MAX ELEV=1.75 FT
                         CH SLP=0.0096     FP SLP=0.0096
                         N=0.02  DIST=141.26
                         DIST    ELEV       DIST    ELEV    DIST    ELEV
                         0.00    1.75       50.00   0.75    54.00   0.67
                         54.46   0.67       54.63   0.00    56.63   0.13
                         70.63   0.41       84.63   0.13    86.63   0.00
                         86.80   0.67       87.26   0.67    91.26   0.75
                         141.26  1.75
*
COMPUTE TRAVEL TIME  ID=2 REACH NO=1 NO VS=1 L=1350 FT
                     SLP=0.0096
ROUTE                ID=2  HYD NO=AP-6R INFLOW ID=10 DT=0.0
PRINT HYD            ID=2 CODE=1
*
*
*S    BASIN O-7
*
COMPUTE NM HYD       ID=3  HYD=O-7   DA=0.0837 SQ MI
                     PER A=20 PER B=20 PER C=30 PER D=30
                     TP=0.19 HR MASS RAIN=-1
*
PRINT HYD            ID=3   CODE=1
*
*
*S    ADD ROUTED FLOWS FROM AP-6 AND BASIN O-7
*
*S    TOTAL FLOW AT AP-7 & TOTAL FLOW INTO NORTH END OF RACE TRACK POND
*S    THROUGH THE 66" RCP
*
*S    TOTAL FLOW AT AP-7
*
ADD HYD              ID=10  HYD=AP-7  ID I=2  ID II=3
PRINT HYD            ID=10 CODE=1
*
*
*S
*S    %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
*S    THIS SECTION WILL ADD THE FLOW FROM THE EXISTING 90" RCP
*S    AND THE EXISTING 66" RCP TOGETHER TO DETERMINE THE TOTAL
*S    OFFSITE FLOW INTO THE RACETRACK POND
*S    %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
*
*
*S    ADD FLOWS FROM AP-4 AND AP-7
*
*S    TOTAL OFF-SITE FLOW FROM THE EAST INTO THE RACE TRACK POND
*
*
ADD HYD              ID=30  HYD=TOTALOFF  ID I=20  ID II=10
PRINT HYD            ID=30 CODE=0
*
*
*S
*S    %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
*S    THIS SECTION WILL DETERMINE BASIN FLOWS INTO GATE 8 OF THE STATE
*S    FAIRGROUNDS.  THIS FLOW WILL NOT ENTER THE RACE TRACK POND.
*S    %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
*
```

```
*
*S    BASIN O-8
*
*S    TOTAL FLOW AT AP-8
*
COMPUTE NM HYD       ID=3   HYD=O-8&AP-8  DA=0.0265 SQ MI
                     PER A=0 PER B=10 PER C=0 PER D=90
                     TP=0.14 HR MASS RAIN=-1
*
PRINT HYD            ID=3   CODE=0
*
*
*
*
*S
*S
*S    %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
*S    THE REMAINDER OF THIS HYDROLOGIC MODEL HAS BEEN DEVELOPED TO DETRMINE
*S    OFF-SITE FLOWS IMPACTING THE SAN PEDRO STORM DRAIN SYSTEM FROM LOMAS
*S    TO ITS OUTFALL AT THE I-40 CHANNEL.  BASED ON THE MOST RECENT CITY OF
*S    ALBUQUERQUE MAPPING, THE CONTRUBUTING BASINS ARE 100% DEVELOPED.
*S    %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
*S
*S    BASIN SPN-1
*
*S    TOTAL FLOW AT MARBLE AND SAN PEDRO
*
COMPUTE NM HYD       ID=50   HYD=SPN-1  DA=0.0240 SQ MI
                     PER A=20 PER B=40 PER C=10 PER D=30
                     TP=0.13 HR MASS RAIN=-1
*
PRINT HYD            ID=50   CODE=1
*
*
*S    35 CFS WILL COLLECTED BY 7 EXISTING STROM DRAIN INLETS IN THE AREA
*S    AND CONVEYED TO THE SAN PEDRO STORM DRAIN. THIS 35 CFS HYDROGRAPH
*S    WILL THEN INSERTED INTO THE SWMM HYDRAULIC MODEL
*
DIVIDE HYD           ID=50  Q=35   ID=51  HYD NO=MARBLE
                                   ID=52  HYD NO=OLFSANPEDRO.1
*
PRINT HYD            ID=51   CODE=0
*
*
*S    BASIN SPN-2
*
*S    TOTAL FLOW AT MOUNTAIN AND SAN PEDRO
*
COMPUTE NM HYD       ID=53   HYD=SPN-2  DA=0.0695 SQ MI
                     PER A=20 PER B=40 PER C=10 PER D=30
                     TP=0.22 HR MASS RAIN=-1
*
PRINT HYD            ID=53   CODE=1
*
*
*S    20 CFS WILL COLLECTED BY 4 EXISTING STROM DRAIN INLETS IN THE AREA
*S    AND CONVEYED TO THE SAN PEDRO STORM DRAIN. THIS 20 CFS HYDROGRAPH
*S    WILL THEN INSERTED INTO THE SWMM HYDRAULIC MODEL
*
DIVIDE HYD           ID=53  Q=20   ID=54  HYD NO=MOUNTAIN
                                   ID=55  HYD NO=OLFSANPEDRO.2
*
PRINT HYD            ID=54   CODE=0
*
*
PRINT HYD            ID=55   CODE=1
*
*
*S    BASIN SPN-3
*
*S    TOTAL FLOW AT SUMMER AND SAN PEDRO
*
COMPUTE NM HYD       ID=56   HYD=SPN-3  DA=0.0593 SQ MI
                     PER A=20 PER B=40 PER C=10 PER D=30
                     TP=0.24 HR MASS RAIN=-1
*
*
PRINT HYD            ID=56   CODE=1
*
```

```
*
*S    20 CFS WILL COLLECTED BY 4 EXISTING STROM DRAIN INLETS IN THE AREA
*S    AND CONVEYED TO THE SAN PEDRO STORM DRAIN. THIS 20 CFS HYDROGRAPH
*S    WILL THEN INSERTED INTO THE SWMM HYDRAULIC MODEL
*
DIVIDE HYD           ID=56  Q=20   ID=57  HYD NO=SUMMER
                                   ID=58  HYD NO=OLFSANPEDRO.3
*
PRINT HYD            ID=57   CODE=0
*
PRINT HYD            ID=58   CODE=1
*
*
*S    BASIN SPN-4
*
*S    TOTAL FLOW AT CONSTITUTION AND SAN PEDRO
*
COMPUTE NM HYD       ID=59   HYD=SPN-4  DA=0.0716 SQ MI
                     PER A=20 PER B=40 PER C=10 PER D=30
                     TP=0.24 HR MASS RAIN=-1
*
*
PRINT HYD            ID=59   CODE=1
*
*
*S    20 CFS WILL COLLECTED BY 4 EXISTING STROM DRAIN INLETS IN THE AREA
*S    AND CONVEYED TO THE SAN PEDRO STORM DRAIN.THIS 20 CFS HYDROGRAPH
*S    WILL THEN INSERTED INTO THE SWMM HYDRAULIC MODEL
*
DIVIDE HYD           ID=59  Q=20   ID=60  HYD NO=CONSTITUTION
                                   ID=61  HYD NO=OLFSANPEDRO.4
*
PRINT HYD            ID=60   CODE=0
*
PRINT HYD            ID=61   CODE=1
*
*
*S    BASIN SPN-5
*
*S    TOTAL FLOW AT ZIMMERMAN AND SAN PEDRO
*
COMPUTE NM HYD       ID=62   HYD=SPN-5  DA=0.06512 SQ MI
                     PER A=20 PER B=40 PER C=10 PER D=30
                     TP=0.13 HR MASS RAIN=-1
*
PRINT HYD            ID=62   CODE=1
*
*
*S    75 CFS WILL COLLECTED BY 15 EXISTING STROM DRAIN INLETS IN THE AREA
*S    AND CONVEYED TO THE SAN PEDRO STORM DRAIN.THIS 75 CFS HYDROGRAPH
*S    WILL THEN INSERTED INTO THE SWMM HYDRAULIC MODEL
*
DIVIDE HYD           ID=62  Q=75   ID=63  HYD NO=ZIMMERMAN
                                   ID=64  HYD NO=OLFSANPEDRO.5
*
PRINT HYD            ID=63   CODE=0
*
PRINT HYD            ID=64   CODE=1
*
*
FINISH
```

AHYMO Summary File

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =06/13/2013
INPUT FILE = Off100.in USER NO.= C_ANDRSN.I01

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION


```
START                                                                                                    TIME=       .00
*S   THIS HYDROLOGIC MODEL HAS BEEN DEVELOPED TO DETRMINE OFF-SITE FLOWS
*S   IMPACTING THE STATE FAIR RACE TRACK POND.  BASED ON THE MOST RECENT
*S   CITY OF ALBUQUERQUE MAPPING, THE CONTRUBUTING BASIN IS 100% DEVELOPED.
*S
*S DATE:  jUNE 13, 2013
*S
*S FILENAME - input         :  OFF100.IN
*S FILENAME - output        :  OFF100.OUT
*S FILENAME - summary table :  OFF100.SUM
*S
*S PROJECT TITLE: LOUISIANA AND LOMAS STROM DRAIN IMPROVEMENTS
*S
*S SEC PROJECT NUMBER: 113108
*S CONSULTANT: SMITH ENGINEERING COMPANY
*S CLIENT: CITY OF ALBUQUERQUE
*S ASSUMPTIONS: LAND TREATMENTS ARE PER C.O.A. DPM CHAPTER 22
*S
*S ---------------------------------------------------------------------
*S       100-YR, 24 HOUR STORM EVENT
*S ---------------------------------------------------------------------
RAINFALL  TYPE= 2                                                                                        RAIN24=   2.780
*S
*S    %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
*S    FIRST, LET US LOOK AT HOW MUCH FLOW EAST OF WYOMING BLVD. WILL
*S    WILL BE IMPACTING THE OFF-SITE BASINS BETWEEN WYOMING AND LOUISIANA
*S    %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
*S    BASIN WE-1
*S    TOTAL FLOW AT WYOMING AND CHICO
COMPUTE NM HYD          WE-1    -    33        .11920       139.80       8.190      1.28833    1.650    1.833 PER IMP=  30.00
*S    THE EXISTING STORM DRAIN IN WYOMING BLVD. WILL INTERCEPT 68 CFS
*S    OF THE FLOW FROM WE-1 AND CARRY IT NORTH TO COPPER ROAD.
*S    THE REMAINING FLOW (HYD WE-1WEST, ID=35) WILL ENTER BASIN O-1.
DIVIDE HYD         WE-1NORTH   33   34        .09522        68.00       6.543      1.28832    1.500    1.116
                    WE-1WEST  AND   35        .02398        71.80       1.647      1.28832    1.650    4.679
*S    ROUTE WE-1NORTH IN THE WYOMING STORM DRAIN FROM CHICO TO COPPER
ROUTE MCUNGE      WE-1NORTHR   34    2        .09522        67.98       6.480      1.27598    1.900    1.116 CCODE =      .2
*S    BASIN WE-2
*S    PARTIAL FLOW AT WYOMING AND COPPER (FLOWING IN COPPER FROM THE EAST)
COMPUTE NM HYD          WE-2    -    43        .07210       138.56       6.889      1.79161    1.500    3.003 PER IMP=  60.00
*S    ADD ROUTED FLOW FROM WE-1NORTHR AND BASIN WE-2
*S    TOTAL FLOW AT WYOMING AND COPPER
ADD HYD            WYO&COPP  2&43  10        .16732       189.59      13.369      1.49816    1.550    1.770
*S    THE EXISTING STORM DRAIN IN WYOMING BLVD. WILL INTERCEPT 177 CFS
*S    OF THE FLOW AT WYOMING AND COPPER AND CARRY IT NORTH TO LOMAS BLVD.
*S    THE REMAINING FLOW (WE-2WEST ID=45) WILL ENTER BASIN O-1.
DIVIDE HYD         WE-2NORTH   10   44        .16658       177.00      13.310      1.49816    1.550    1.660
                    WE-2WEST  AND   45        .00074        12.59        .059      1.49816    1.550   26.611
*S    ROUTE WE-2NORTH IN THE WYOMING STORM DRAIN FROM COPPER TO
*S    SOUTH BOUNDARY OF LOS ALTOS GOLF COURSE ALONG WYOMING
```


COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION

```
ROUTE MCUNGE      WE-2NORTHR   44    2        .16658       174.05      13.270      1.49364    1.650    1.632 CCODE =      .2
*S    BASIN WE-3
*S    PARTIAL FLOW AT WYOMING AND SOUTH EDGE OF LOS ALTOS GOLF COURSE
COMPUTE NM HYD          WE-3    -    53        .05930       131.01       7.424      2.34746    1.550    3.452 PER IMP=  90.00
*S    ADD ROUTED FLOW FROM WE-2NORTH AND BASIN WE-3
*S    TOTAL FLOWS AT WYOMING AND SOUTH EDGE OF LOS ALTOS GOLF COURSE
ADD HYD            WYO&SELAGC  2&53  10        .22588       295.47      20.694      1.71778    1.600    2.044
*S    THE EXISTING STORM DRAIN IN WYOMING BLVD. WILL INTERCEPT 205 CFS
*S    OF THE FLOW FROM WYOMING AND THE SOUTH EDGE OF LOS ALTOS GOLF COURSE
*S    AMD CARRY IT NORTH TO LOMAS BLVD. ALL EXCESS FLOW NOT ENTERING THE
*S    WYOMING STORM DRAIN WILL FLOW IN THE WYOMING BLVD. STREET SECTION
*S    TO LOMAS BLVD.
DIVIDE HYD         WE-3NORTH1   10   54        .21101       205.00      19.332      1.71778    1.500    1.518
                   WE-3NORTH2  AND   55        .01488        90.47       1.363      1.71778    1.600    9.503
*S    BASIN WE-4
*S    FLOW FROM THE LOS ALTOS GOLF COURSE IMPACTING WYOMING BLVD.
COMPUTE NM HYD          WE-4    -    63        .09190        58.77       4.455       .90903    1.800     .999 PER IMP=   7.00
*S    THE FLOW FROM WE-4 WILL DRAIN TO WYOMING AND REMAIN IN THE
*S    STREET AS THE STORM DRAIN LINE IN WYOMING IS FULL
*S    ADD FLOW FROM WE-3NORTH2 AND BASIN WE-4
*S    TOTAL FLOWS IN WYOMING AT LOMAS (NOT INCLUDING STORM DRAIN FLOW)
ADD HYD            WYO&LOMAS 55&63  70        .10678       127.32       5.818      1.02170    1.600    1.863
*S    %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
*S    THIS SECTION WILL ROUTE AND ADD BASIN FLOWS
*S    INTO THE RACETRACK POND AT COPPER AND LOUISIANA
*S    THROUGH THE EXISTING 90" RCP
*S    %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
*S    FIRST WE MUST ROUTE THE BY-PASS FLOW FROM WYOMING AND CHICO
*S    (WE-1WEST) THROUGH BASIN O-1 TO AP-1
ROUTE               WE-1WESTR   35    2        .02398        40.97       1.648      1.28865    1.750    2.670
*S    SECOND WE MUST ROUTE THE BY-BASS FLOW FROM WYOMING AND COPPER
*S    (WE-2WEST) THROUGH BASIN O-1 TO AP-1
ROUTE               WE-2WESTR   45   12        .00074         2.23        .059      1.50864    1.600    4.707
*S    ADD BASINS WE-1WESTR AND WE-2WESTR AT AP-1
*S    PARTIAL FLOW TO AP-1
ADD HYD             PARTAP-1  2&12  10        .02472        42.07       1.707      1.29515    1.750    2.660
*S    BASIN O-1
*S    PARTIAL FLOW AT AP-1
COMPUTE NM HYD            O-1    -     3        .13630       147.72       9.365      1.28833    1.650    1.693 PER IMP=  30.00
*S    ADD BASINS WE-1WESTR AND WE-2WESTR TO O-1 AT AP-1
*S    TOTAL FLOW TO AP-1
ADD HYD               AP-1 10& 3  20        .16102       184.72      11.072      1.28937    1.700    1.792
*S    ROUTE FLOW FROM AP-1 DOWN COPPER AVE. THRU BASIN O-2 TO AP-2
ROUTE                 AP-1R   20    2        .16102       171.83      11.072      1.28937    1.800    1.667
```

```
*S    BASIN O-2
COMPUTE NM HYD          O-2    -     3        .09720       113.82       6.679      1.28833    1.650    1.830 PER IMP=  30.00
*S    ADD BASINS O-1 AND O-2 AT AP-2
*S    TOTAL FLOWS TO AP-2
ADD HYD                 AP-2  2& 3  20        .25822       268.69      17.751      1.28898    1.750    1.626
*S    116 CFS AT AP-2 WILL BE INTERCEPTED BY THE DALLAS STORM DRAIN SYSTEM
*S    AND TAKEN NORTH TO THE I-40 CHANNEL
```

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
DIVIDE HYD	DALSD	20	66	.19328	116.00	13.287	1.28898	1.550	.938	
	REVAP-2 AND	10		.06494	152.69	4.464	1.28898	1.750	3.674	
*S	ROUTE FLOW FROM REVAP-2 DOWN COPPER AVE. THRU BASIN O-3 TO AP-3									
ROUTE	AP-2R	10	2	.06494	140.62	4.465	1.28909	1.800	3.383	
*S	BASIN O-3									
COMPUTE NM HYD	O-3	-	3	.08030	109.92	5.517	1.28833	1.600	2.139	PER IMP= 30.00
*S	ADD FLOWS FROM AP-2 AND BASIN O-3									
*S	TOTAL FLOW AT AP-3									
ADD HYD	AP-3	2& 3	10	.14524	205.45	9.982	1.28866	1.750	2.210	
*S	ROUTE FLOW FROM AP-3 DOWN COPPER AVE. THRU BASIN O-4 TO AP-4									
ROUTE	AP-3R	10	2	.14524	195.60	9.982	1.28867	1.800	2.104	
*S	BASIN o-4									
COMPUTE NM HYD	O-4	-	3	.07330	87.49	5.037	1.28833	1.650	1.865	PER IMP= 30.00
*S	ADD FLOWS FROM AP-3 AND BASIN O-4									
*S	PARTIAL FLOW AT AP-4									
ADD HYD	PARTAP-4	2& 3	10	.21854	258.86	15.019	1.28855	1.800	1.851	
*S	RECALLING HYDROGRAPH FROM CAMPUS WASH DRAINAGE STUDY - FLOW FROM									
*S	ALCAZAR STORM DRAIN ENTERS BASIN O-4 FROM THE SOUTH AND WILL EVENTUALLY									
*S	REACH AP-4									
RECALL HYD	218.I	-	99	.41870	412.00	47.422	2.12364	1.700	1.537	
*S	REMOVE 150 CFS FROM THE ALCAZAR STORM DRAIN DUE TO THE FACT BASINS									
*S	O-3 & O-4 GENERATE FLOW THAT WILL FILL THE ALCAZAR STROM DRAIN WITH									
*S	150 CFS. WITH THAT SAID, ONLY 262 CFS OF THE RECALLED HYDROGRAPH									
*S	WILL ENTER BASIN O-4.									
DIVIDE HYD	CENTRAL	99	98	.27315	150.00	30.937	2.12364	1.450	.858	
	ALCAZAR AND	97		.14555	262.00	16.486	2.12364	1.700	2.813	
*S	ADD FLOWS FROM THE ALCAZAR STORM DRAIN AND BASIN O-4									
*S	TOTAL FLOW AT AP-4 & TOTAL FLOWS INTO SOUTH END OF RACE TRACK POND									
*S	THROUGH THE EXISTING 90" RCP									
ADD HYD	AP-4 10&97	20		.36409	517.84	31.504	1.62239	1.750	2.222	
*S	%%%									
*S	THIS SECTION WILL ROUTE AND ADD BASIN FLOWS									
*S	INTO THE RACETRACK POND AT MARQUETTE AND LOUISIANA									
*S	THROUGH THE EXISTING 66" RCP									
*S	%%%									
*S	BASIN O-5									
*S	TOTAL FLOW AT AP-5									
COMPUTE NM HYD	O-5&AP-5	-	3	.02910	48.83	1.999	1.28833	1.500	2.622	PER IMP= 30.00
*S	ROUTE FLOW BASIN O-5 FROM AP-5 DOWN VARIOUS STREETS THRU BASIN O-6									
*S	TO AP-6									
ROUTE	AP-5R	3	2	.02910	36.87	2.000	1.28834	1.600	1.980	
*S	BASIN O-6									
COMPUTE NM HYD	O-6	-	3	.05990	93.98	4.116	1.28833	1.550	2.451	PER IMP= 30.00
*S	ADD BASINS O-5 AND O-6 AT AP-6									
*S	TOTAL FLOWS TO AP-6									
ADD HYD	AP-6	2& 3	10	.08900	126.86	6.115	1.28832	1.550	2.227	
*S	ROUTE FLOW FROM AP-6 DOWN MARQUETTE AVE. THRU BASIN O-7 TO AP-7									
ROUTE	AP-6R	10	2	.08900	109.58	6.115	1.28833	1.650	1.924	
*S	BASIN O-7									
COMPUTE NM HYD	O-7	-	3	.08370	123.36	5.751	1.28833	1.550	2.303	PER IMP= 30.00
*S	ADD ROUTED FLOWS FROM AP-6 AND BASIN O-7									
*S	TOTAL FLOW AT AP-7 & TOTAL FLOW INTO NORTH END OF RACE TRACK POND									
*S	THROUGH THE 66" RCP									

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
*S	TOTAL FLOW AT AP-7									
ADD HYD	AP-7	2& 3	10	.17270	225.22	11.866	1.28832	1.600	2.038	
*S										
*S	%%%									
*S	THIS SECTION WILL ADD THE FLOW FROM THE EXISTING 90" RCP									
*S	AND THE EXISTING 66" RCP TOGETHER TO DETERMINE THE TOTAL									
*S	OFFSITE FLOW INTO THE RACETRACK POND									
*S	%%%									
*S	ADD FLOWS FROM AP-4 AND AP-7									
*S	TOTAL OFF-SITE FLOW FROM THE EAST INTO THE RACE TRACK POND									
ADD HYD	TOTALOFF 20&10	30		.53679	696.04	43.370	1.51491	1.700	2.026	
*S										
*S	%%%									
*S	THIS SECTION WILL DETERMINE BASIN FLOWS INTO GATE 8 OF THE STATE									
*S	FAIRGROUNDS. THIS FLOW WILL NOT ENTER THE RACE TRACK POND.									
*S	%%%									
*S	BASIN O-8									
*S	TOTAL FLOW AT AP-8									
COMPUTE NM HYD	O-8&AP-8	-	3	.02650	67.15	3.318	2.34746	1.500	3.959	PER IMP= 90.00
*S										
*S										
*S	%%%									
*S	THE REMAINDER OF THIS HYDROLOGIC MODEL HAS BEEN DEVELOPED TO DETRMINE									
*S	OFF-SITE FLOWS IMPACTING THE SAN PEDRO STORM DRAIN SYSTEM FROM LOMAS									
*S	TO ITS OUTFALL AT THE I-40 CHANNEL. BASED ON THE MOST RECENT CITY OF									
*S	ALBUQUERQUE MAPPING, THE CONTRUBUTING BASINS ARE 100% DEVELOPED.									
*S	%%%									
*S										
*S	BASIN SPN-1									
*S	TOTAL FLOW AT MARBLE AND SAN PEDRO									
COMPUTE NM HYD	SPN-1	-	50	.02400	42.03	1.582	1.23602	1.500	2.736	PER IMP= 30.00
*S	35 CFS WILL COLLECTED BY 7 EXISTING STROM DRAIN INLETS IN THE AREA									
*S	AND CONVEYED TO THE SAN PEDRO STORM DRAIN. THIS 35 CFS HYDROGRAPH									
*S	WILL THEN INSERTED INTO THE SWMM HYDRAULIC MODEL									
DIVIDE HYD	MARBLE	50	51	.02331	35.00	1.537	1.23601	1.450	2.346	
	OLFSANPEDRO. AND	52		.00069	7.03	.046	1.23601	1.500	15.899	

```
*S    BASIN SPN-2
*S    TOTAL FLOW AT MOUNTAIN AND SAN PEDRO
COMPUTE NM HYD         SPN-2   -    53        .06950        88.03       4.582      1.23602    1.600    1.979 PER IMP=  30.00
*S    20 CFS WILL COLLECTED BY 4 EXISTING STROM DRAIN INLETS IN THE AREA
*S    AND CONVEYED TO THE SAN PEDRO STORM DRAIN. THIS 20 CFS HYDROGRAPH
*S    WILL THEN INSERTED INTO THE SWMM HYDRAULIC MODEL
DIVIDE HYD          MOUNTAIN   53   54        .04034        20.00       2.659      1.23602    1.400     .775
               OLFSANPEDRO.  AND   55        .02916        68.03       1.922      1.23602    1.600    3.645
*S    BASIN SPN-3
*S    TOTAL FLOW AT SUMMER AND SAN PEDRO
COMPUTE NM HYD         SPN-3   -    56        .05930        70.92       3.909      1.23602    1.600    1.869 PER IMP=  30.00
*S    20 CFS WILL COLLECTED BY 4 EXISTING STROM DRAIN INLETS IN THE AREA
*S    AND CONVEYED TO THE SAN PEDRO STORM DRAIN. THIS 20 CFS HYDROGRAPH
*S    WILL THEN INSERTED INTO THE SWMM HYDRAULIC MODEL
DIVIDE HYD            SUMMER   56   57        .03783        20.00       2.494      1.23601    1.450     .826
               OLFSANPEDRO.  AND   58        .02147        50.92       1.415      1.23601    1.600    3.706
*S    BASIN SPN-4
```


COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION

```
*S    TOTAL FLOW AT CONSTITUTION AND SAN PEDRO
COMPUTE NM HYD         SPN-4   -    59        .07160        85.69       4.720      1.23602    1.600    1.870 PER IMP=  30.00
*S    20 CFS WILL COLLECTED BY 4 EXISTING STROM DRAIN INLETS IN THE AREA
*S    AND CONVEYED TO THE SAN PEDRO STORM DRAIN.THIS 20 CFS HYDROGRAPH
*S    WILL THEN INSERTED INTO THE SWMM HYDRAULIC MODEL
DIVIDE HYD       CONSTITUTION   59   60        .04188        20.00       2.761      1.23602    1.400     .746
               OLFSANPEDRO.  AND   61        .02972        65.69       1.959      1.23602    1.600    3.454
*S    BASIN SPN-5
*S    TOTAL FLOW AT ZIMMERMAN AND SAN PEDRO
COMPUTE NM HYD         SPN-5   -    62        .06512       114.05       4.293      1.23602    1.500    2.737 PER IMP=  30.00
*S    75 CFS WILL COLLECTED BY 15 EXISTING STROM DRAIN INLETS IN THE AREA
*S    AND CONVEYED TO THE SAN PEDRO STORM DRAIN.THIS 75 CFS HYDROGRAPH
*S    WILL THEN INSERTED INTO THE SWMM HYDRAULIC MODEL
DIVIDE HYD          ZIMMERMAN   62   63        .05922        75.00       3.904      1.23602    1.450    1.979
               OLFSANPEDRO.  AND   64        .00590        39.05        .389      1.23602    1.500   10.350
FINISH
```

APPENDIX B

Hydraulic Analysis

APPENDIX B CONTENTS

HYDRAULIC ANALYSIS

Methodology and Assumptions

The 100-year, 24-hour storm event was used for all analyses in accordance with COA design criteria for detention and retention ponds (COA DPM, Volume II, Chapter 22). Collection capacities of drop inlets were evaluated in the hydrologic analysis, and are accounted for in the AHYMO input file. Therefore, hydrographs computed by AHYMO of flows collected by the modeled storm drain systems are directly applied to nodes (manholes and detention ponds). AHYMO hydrograph identification numbers used (for both on-site and off-site basins) and associated input locations in the model are shown on the SWMM Maps located in this appendix. Refer to Exhibit A1: Drainage Basin Map located in Appendix A for on- and off-site drainage basin boundaries.

Dynamic wave modeling was used for this study which allows for simulation of reverse flow conditions in pipes. This was desirable to model the surge pond behavior of the San Pedro North and South Detention Basins. To use this feature, detention pond data is input in the form of a stage-storage table, and discharge is computed by the program depending on the hydraulic conditions of the system at any point in time. Stage-storage tables for existing conditions were developed from 2013 survey data provided by Surveying Control, Inc.

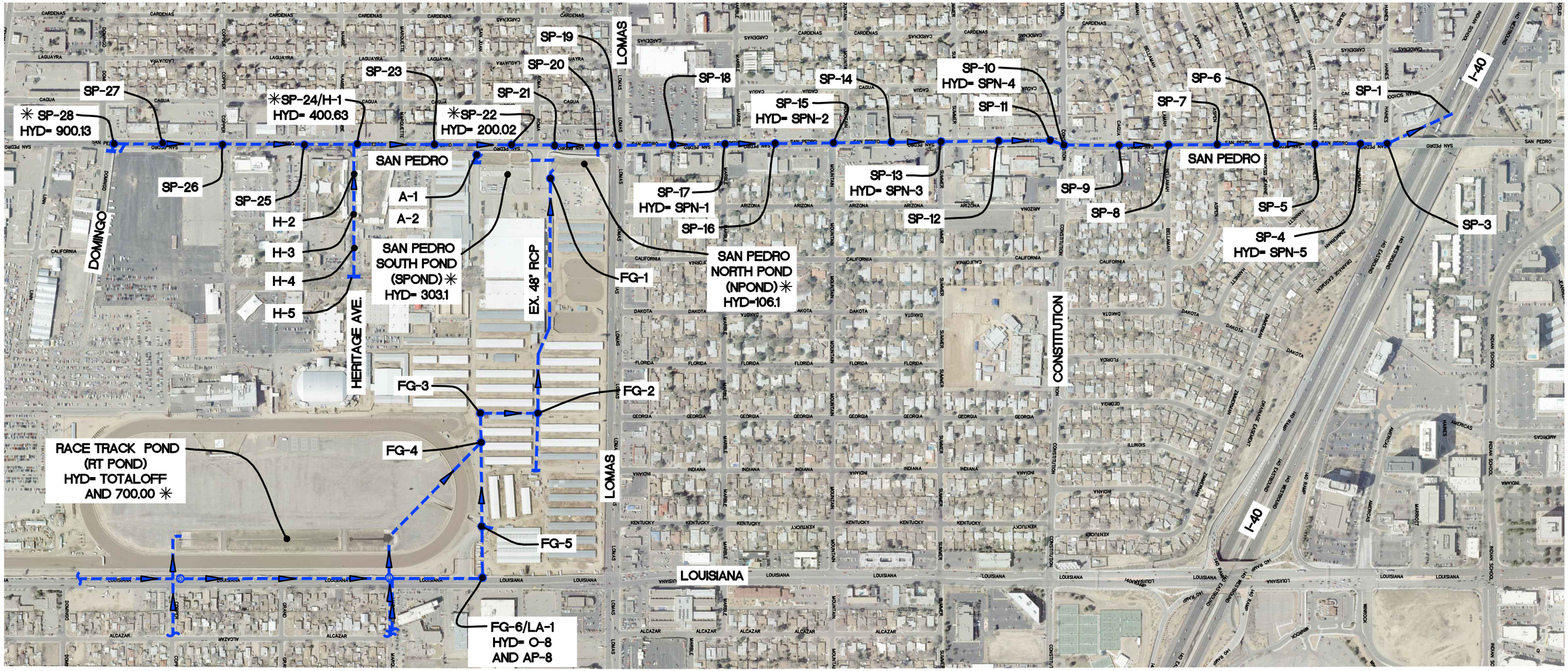
To simulate bolted manhole covers a surcharge depth of 100 feet was applied to manholes with bolted covers. In SWMM, this allows the Hydraulic Grade Line (HGL) to reach elevations up to 100 feet greater than the pipe crown elevation without any volume of storm water overtopping the manhole and being "lost," or removed, from the simulation. Lost water creates a volume imbalance in the model (total inflow is not equal to total outflow) and for purposes of this study, is assumed to proceed overland to downstream basins. No ponding was allowed for manhole covers that are not bolted. This means that for manholes in which the HGL exceeds the rim elevation, the volume of storm water that floods the manhole is lost from the system.

All conduits in the model were assumed to be RCP with a Manning's roughness coefficient ("n" value) of 0.013. Pipe lengths were determined from manhole coordinates within the study area (from 2013 survey data provided by Surveying Control, Inc.). Pipe and manhole inverts were obtained from record drawings and adjusted by adding 2.65 feet to convert from the NAVD 29 datum to the NAVD 88 datum.

Due to limited inlet capacities in the Louisiana East Off-Site Basin (shown on Exhibit A1, Drainage Basin Map), storm water ponds in Louisiana Boulevard during the 100-year storm event. All models developed for this study assume that improvements will be made by the COA in the future to eliminate the ponding in Louisiana Boulevard, allowing this storm water to be conveyed to the Racetrack Detention Basin (shown on Exhibit 4: Existing Conditions, located in the report text).

Please see the remainder of this appendix for maps showing the element names and locations used in SWMM and detailed SWMM outputs.

SWMM Maps



SCALE: 1" = 300'

300' 0 300' 600' 900'Feet

NOTES:

1. ON-SITE HYDROGRAPHS FROM "STORM DRAIN INVESTIGATION REPORT FOR SAN PEDRO BOULEVARD AND THE NEW MEXICO STATE FAIRGROUNDS" (SMITH ENGINEERING COMPANY, 1995).
2. HYDROGRAPH NUMBERS CORRESPOND TO HYDROGRAPH NUMBERS IN SOURCE AHYMO FILE.

LEGEND

- EXISTING STORM DRAIN W/FLOW DIRECTION
- SP-15 — SWMM NODE ID
- ✳ — ON-SITE HYDROGRAPH
- HYD= SPN-2 — HYDROGRAPH INPUT

SEC JOB # 113108

SMITH ENGINEERING COMPANY
SOLUTIONS FOR TODAY... VISION FOR TOMORROW
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Building 4, Suite 200
Albuquerque, NM 87110
Phone: (505) 884-0700
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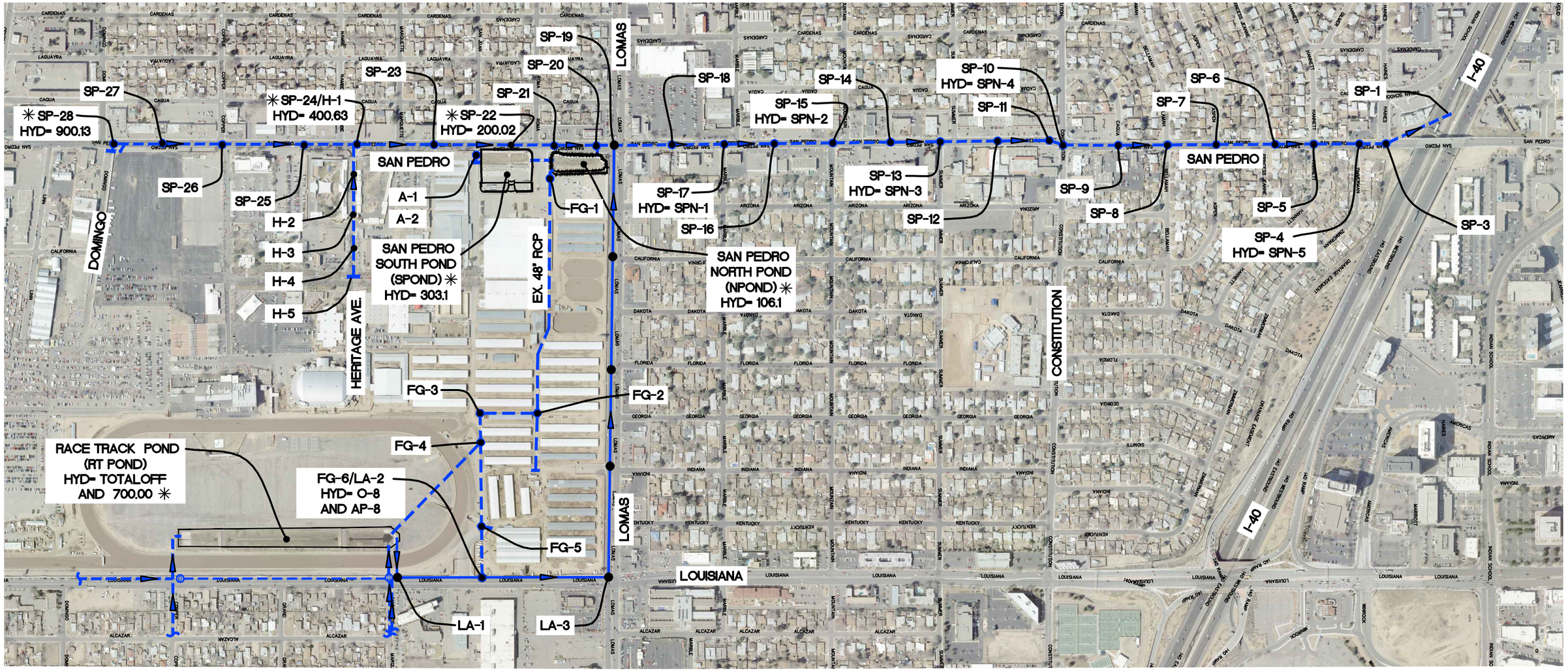
NEW MEXICO TEXAS

CITY OF ALBUQUERQUE
DEPARTMENT OF MUNICIPAL DEVELOPMENT
ENGINEERING DIVISION
Date: AUGUST-2013

TITLE:
DESIGN ANALYSIS REPORT FOR STORM WATER QUALITY IMPROVEMENTS AT LOMAS AND LOUISIANA
SWMM MAP 1
EXISTING CONDITIONS, DESIGN OPTIONS 1 and 2

City Project No.	Zone Map No.	Drawing No.
730491	K-18	EXHIBIT B1



SCALE: 1" = 300'

300' 0 300' 600' 900'Feet

NOTES:

1. ON-SITE HYDROGRAPHS FROM "STORM DRAIN INVESTIGATION REPORT FOR SAN PEDRO BOULEVARD AND THE NEW MEXICO STATE FAIRGROUNDS" (SMITH ENGINEERING COMPANY, 1995).
2. HYDROGRAPH NUMBERS CORRESPOND TO HYDROGRAPH NUMBERS IN SOURCE AHYMO FILE.

LEGEND

- EXISTING STORM DRAIN W/FLOW DIRECTION
- PROPOSED STORM DRAIN W/ FLOW DIRECTION
- ABANDONED 48" RCP FAIRGROUNDS STORM DRAIN
- SP-15 — SWMM NODE ID
- ✳ — ON-SITE HYDROGRAPH
- HYD= SPN-2 — HYDROGRAPH INPUT

SEC JOB # 113108

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NEW MEXICO TEXAS

CITY OF ALBUQUERQUE
DEPARTMENT OF MUNICIPAL DEVELOPMENT
ENGINEERING DIVISION
Date: AUGUST-2013

TITLE:
DESIGN ANALYSIS REPORT FOR STORM WATER QUALITY IMPROVEMENTS AT LOMAS AND LOUISIANA SWMM MAP 2 DESIGN OPTION 3

City Project No.	Zone Map No.	Drawing No.
730491	K-18	EXHIBIT B2

SWMM Output Data

Existing Conditions Model - 100-Year Storm

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

Existing Conditions Model - 100-Year Storm
Louisiana and Lomas Storm Drain Improvements, COA Project No. 730491

***********************************************************
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 ........ YES
  Water Quality .......... NO
Flow Routing Method ...... DYNWAVE
Starting Date ............ APR-01-2013 00:00:00
Ending Date .............. APR-04-2013 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:00:15
Routing Time Step ........ 1.00 sec


*************
Element Count
*************
Number of rain gages ...... 0
Number of subcatchments ... 0
Number of nodes ........... 42
Number of links ........... 42
Number of pollutants ...... 0
Number of land uses ....... 0


************
Node Summary
************
                                    Invert      Max.    Ponded    External
Name                Type             Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------
SP-28               JUNCTION       5280.18      6.13       0.0    Yes
SP-27               JUNCTION       5277.74      9.86       0.0
SP-26               JUNCTION       5276.24     12.43       0.0
SP-25               JUNCTION       5273.95     13.49       0.0
SP-24/H-1           JUNCTION       5272.76      9.41       0.0    Yes
SP-23               JUNCTION       5269.53      6.40       0.0
SP-22               JUNCTION       5266.99      8.04       0.0    Yes
SP-21               JUNCTION       5266.30      9.89       0.0
SP-20               JUNCTION       5265.84     11.58       0.0
SP-19               JUNCTION       5265.79     10.71       0.0
SP-18               JUNCTION       5263.27     10.55       0.0
SP-17               JUNCTION       5261.57      8.74       0.0    Yes
SP-16               JUNCTION       5260.10      7.36       0.0
SP-15               JUNCTION       5257.62      8.56       0.0    Yes
SP-14               JUNCTION       5255.73      9.33       0.0
SP-13               JUNCTION       5253.70      9.83       0.0    Yes
SP-12               JUNCTION       5252.29     10.26       0.0
SP-11               JUNCTION       5249.84     11.39       0.0
SP-10               JUNCTION       5249.22     11.34       0.0    Yes
SP-9                JUNCTION       5247.42     10.53       0.0
SP-8                JUNCTION       5244.68     11.58       0.0
SP-7                JUNCTION       5242.35     12.26       0.0
SP-6                JUNCTION       5239.75     11.67       0.0
```

SP-5	JUNCTION	5236.42	11.96	0.0	
SP-4	JUNCTION	5232.86	12.14	0.0	Yes
SP-3	JUNCTION	5231.86	19.57	0.0	
H-5	JUNCTION	5277.23	9.25	0.0	
H-4	JUNCTION	5276.05	7.40	0.0	
H-3	JUNCTION	5274.96	7.70	0.0	
H-2	JUNCTION	5273.98	8.02	0.0	
A-2	JUNCTION	5269.55	6.63	0.0	
A-1	JUNCTION	5269.07	6.04	0.0	
FG-6/LA-1	JUNCTION	5299.95	9.65	0.0	Yes
FG-5	JUNCTION	5296.46	9.00	0.0	
FG-4	JUNCTION	5291.41	7.38	0.0	
FG-3	JUNCTION	5290.06	8.30	0.0	
FG-2	JUNCTION	5286.18	7.72	0.0	
FG-1	JUNCTION	5271.79	6.85	0.0	
SP-1	OUTFALL	5222.92	5.00	0.0	
RTPond	STORAGE	5297.23	10.27	0.0	Yes
NPond	STORAGE	5266.29	10.71	0.0	Yes
SPond	STORAGE	5267.50	7.00	0.0	Yes

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
SP-28/27	SP-28	SP-27	CONDUIT	296.0	0.8244	0.0130
SP-27/26	SP-27	SP-26	CONDUIT	362.0	0.4144	0.0130
SP-26/25	SP-26	SP-25	CONDUIT	497.0	0.4608	0.0130
SP-25/24	SP-25	SP-24/H-1	CONDUIT	321.0	0.3707	0.0130
SP-24/23	SP-24/H-1	SP-23	CONDUIT	468.0	0.6902	0.0130
SP-23/22	SP-23	SP-22	CONDUIT	467.0	0.5439	0.0130
SP-22/21	SP-22	SP-21	CONDUIT	263.0	0.2624	0.0130
SP-21/20	SP-21	SP-20	CONDUIT	255.0	0.1804	0.0130
SP-20/19	SP-20	SP-19	CONDUIT	164.0	0.0305	0.0130
SP-19/18	SP-19	SP-18	CONDUIT	114.0	2.2111	0.0130
SP-18/17	SP-18	SP-17	CONDUIT	338.0	0.5030	0.0130
SP-17/16	SP-17	SP-16	CONDUIT	304.0	0.4836	0.0130
SP-16/15	SP-16	SP-15	CONDUIT	354.0	0.7006	0.0130
SP-15/14	SP-15	SP-14	CONDUIT	350.0	0.5400	0.0130
SP-14/13	SP-14	SP-13	CONDUIT	301.0	0.6744	0.0130
SP-13/12	SP-13	SP-12	CONDUIT	349.0	0.4040	0.0130
SP-12/11	SP-12	SP-11	CONDUIT	313.0	0.7828	0.0130
SP-11/10	SP-11	SP-10	CONDUIT	88.0	0.7046	0.0130
SP-10/9	SP-10	SP-9	CONDUIT	335.0	0.5373	0.0130
SP-9/8	SP-9	SP-8	CONDUIT	291.0	0.9416	0.0130
SP-8/7	SP-8	SP-7	CONDUIT	295.0	0.7899	0.0130
SP-7/6	SP-7	SP-6	CONDUIT	357.0	0.7283	0.0130
SP-6/5	SP-6	SP-5	CONDUIT	235.0	1.4172	0.0130
SP-5/4	SP-5	SP-4	CONDUIT	276.0	1.2900	0.0130
SP-4/3	SP-4	SP-3	CONDUIT	162.0	0.6173	0.0130
SP-3/1	SP-3	SP-1	CONDUIT	430.0	2.0795	0.0130
H-5/4	H-5	H-4	CONDUIT	248.0	0.4758	0.0130
H-4/3	H-4	H-3	CONDUIT	230.0	0.4739	0.0130
H-3/2	H-3	H-2	CONDUIT	203.0	0.4828	0.0130
H-2/1	H-2	SP-24/H-1	CONDUIT	82.0	0.3049	0.0130
A-2/1	A-2	A-1	CONDUIT	36.0	1.0278	0.0130
A-1/SPond	A-1	SPond	CONDUIT	31.9	1.5025	0.0130
FG-6/5	FG-6/LA-1	FG-5	CONDUIT	311.0	1.1223	0.0130
FG-5/4	FG-5	FG-4	CONDUIT	509.0	0.9922	0.0130
FG-4/3	FG-4	FG-3	CONDUIT	177.6	0.7602	0.0130
FG-3/2	FG-3	FG-2	CONDUIT	348.3	1.1141	0.0130
FG-2/1	FG-2	FG-1	CONDUIT	1438.0	1.0007	0.0130
FG-1/NPond	FG-1	NPond	CONDUIT	59.0	5.5339	0.0130
RTPond/FG-4	RTPond	FG-4	CONDUIT	753.0	0.5897	0.0130
SPond/NPond	SPond	NPond	CONDUIT	135.3	0.3843	0.0130
SPond/SP-22	SPond	SP-22	CONDUIT	21.0	7.5932	0.0130
NPond/SP-20	NPond	SP-20	CONDUIT	66.9	0.5085	0.0130

****
Cross Section Summary

Existing Conditions Model - 100-Year Storm

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Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
SP-28/27	CIRCULAR	5.50	23.76	1.38	5.50	1	304.89
SP-27/26	CIRCULAR	5.50	23.76	1.38	5.50	1	216.17
SP-26/25	CIRCULAR	5.50	23.76	1.38	5.50	1	227.95
SP-25/24	CIRCULAR	5.50	23.76	1.38	5.50	1	204.46
SP-24/23	CIRCULAR	4.00	12.57	1.00	4.00	2	119.34
SP-23/22	CIRCULAR	4.00	12.57	1.00	4.00	2	105.94
SP-22/21	CIRCULAR	5.00	19.63	1.25	5.00	1	133.40
SP-21/20	CIRCULAR	5.00	19.63	1.25	5.00	1	110.62
SP-20/19	CIRCULAR	4.50	15.90	1.13	4.50	1	34.34
SP-19/18	CIRCULAR	4.50	15.90	1.13	4.50	1	292.41
SP-18/17	CIRCULAR	4.50	15.90	1.13	4.50	1	139.46
SP-17/16	CIRCULAR	4.50	15.90	1.13	4.50	1	136.75
SP-16/15	CIRCULAR	4.50	15.90	1.13	4.50	1	164.60
SP-15/14	CIRCULAR	4.50	15.90	1.13	4.50	1	144.51
SP-14/13	CIRCULAR	4.50	15.90	1.13	4.50	1	161.50
SP-13/12	CIRCULAR	4.50	15.90	1.13	4.50	1	124.99
SP-12/11	CIRCULAR	4.50	15.90	1.13	4.50	1	173.98
SP-11/10	CIRCULAR	4.50	15.90	1.13	4.50	1	165.06
SP-10/9	CIRCULAR	4.50	15.90	1.13	4.50	1	144.15
SP-9/8	CIRCULAR	4.50	15.90	1.13	4.50	1	190.82
SP-8/7	CIRCULAR	4.50	15.90	1.13	4.50	1	174.77
SP-7/6	CIRCULAR	4.50	15.90	1.13	4.50	1	167.82
SP-6/5	CIRCULAR	4.50	15.90	1.13	4.50	1	234.10
SP-5/4	CIRCULAR	5.00	19.63	1.25	5.00	1	295.80
SP-4/3	CIRCULAR	5.00	19.63	1.25	5.00	1	204.62
SP-3/1	CIRCULAR	5.00	19.63	1.25	5.00	1	375.57
H-5/4	CIRCULAR	3.50	9.62	0.88	3.50	1	69.40
H-4/3	CIRCULAR	3.50	9.62	0.88	3.50	1	69.26
H-3/2	CIRCULAR	3.50	9.62	0.88	3.50	1	69.90
H-2/1	CIRCULAR	3.50	9.62	0.88	3.50	1	55.55
A-2/1	CIRCULAR	3.00	7.07	0.75	3.00	1	67.62
A-1/SPond	CIRCULAR	4.00	12.57	1.00	4.00	1	176.07
FG-6/5	CIRCULAR	4.00	12.57	1.00	4.00	1	152.17
FG-5/4	CIRCULAR	4.00	12.57	1.00	4.00	1	143.08
FG-4/3	CIRCULAR	4.00	12.57	1.00	4.00	1	125.24
FG-3/2	CIRCULAR	4.00	12.57	1.00	4.00	1	151.62
FG-2/1	CIRCULAR	4.00	12.57	1.00	4.00	1	143.70
FG-1/NPond	CIRCULAR	4.00	12.57	1.00	4.00	1	337.91
RTPond/FG-4	CIRCULAR	3.00	7.07	0.75	3.00	1	51.22
SPond/NPond	CIRCULAR	6.00	28.27	1.50	6.00	2	262.55
SPond/SP-22	RECT_CLOSED	6.00	48.00	1.71	8.00	1	2165.64
NPond/SP-20	CIRCULAR	2.50	4.91	0.63	2.50	1	29.25

****
Control Actions Taken
****

********** Flow Routing Continuity **********	Volume acre-feet	Volume 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	87.157	28.401
External Outflow	78.306	25.517
Internal Outflow	8.902	2.901
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-0.059	

****
Time-Step Critical Elements

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None

****
Highest Flow Instability Indexes
****
Link NPond/SP-20 (7)

****
Routing Time Step Summary
****
Minimum Time Step : 0.50 sec
Average Time Step : 1.00 sec
Maximum Time Step : 1.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.01

****
Node Depth Summary
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Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days	hr:min
SP-28	JUNCTION	0.13	3.91	5284.09	0	01:42
SP-27	JUNCTION	0.16	5.49	5283.23	0	01:42
SP-26	JUNCTION	0.16	6.10	5282.34	0	01:42
SP-25	JUNCTION	0.17	6.99	5280.94	0	01:42
SP-24/H-1	JUNCTION	0.16	7.22	5279.98	0	01:42
SP-23	JUNCTION	0.25	6.76	5276.29	0	01:43
SP-22	JUNCTION	0.46	7.52	5274.51	0	01:55
SP-21	JUNCTION	0.51	7.74	5274.04	0	01:57
SP-20	JUNCTION	0.60	7.74	5273.58	0	01:57
SP-19	JUNCTION	0.39	6.47	5272.26	0	01:56
SP-18	JUNCTION	0.54	10.55	5273.82	0	01:32
SP-17	JUNCTION	0.53	8.74	5270.31	0	01:32
SP-16	JUNCTION	0.48	7.36	5267.46	0	01:32
SP-15	JUNCTION	0.53	8.56	5266.18	0	01:31
SP-14	JUNCTION	0.50	9.33	5265.06	0	01:31
SP-13	JUNCTION	0.54	8.97	5262.67	0	01:32
SP-12	JUNCTION	0.45	9.30	5261.59	0	01:32
SP-11	JUNCTION	0.48	7.69	5257.53	0	01:32
SP-10	JUNCTION	0.48	7.71	5256.93	0	01:32
SP-9	JUNCTION	0.40	5.53	5252.95	0	01:34
SP-8	JUNCTION	0.42	5.32	5250.00	0	01:34
SP-7	JUNCTION	0.42	4.19	5246.54	0	01:34
SP-6	JUNCTION	0.35	3.31	5243.06	0	01:35
SP-5	JUNCTION	0.34	3.34	5239.76	0	01:35
SP-4	JUNCTION	0.42	4.58	5237.44	0	01:39
SP-3	JUNCTION	0.30	3.23	5235.09	0	01:35
H-5	JUNCTION	0.01	2.73	5279.96	0	01:43
H-4	JUNCTION	0.02	3.99	5280.04	0	01:42
H-3	JUNCTION	0.03	5.06	5280.02	0	01:42
H-2	JUNCTION	0.04	6.02	5280.00	0	01:42
A-2	JUNCTION	0.14	4.95	5274.50	0	01:55
A-1	JUNCTION	0.18	5.43	5274.50	0	01:55
FG-6/LA-1	JUNCTION	0.07	1.93	5301.88	0	01:30
FG-5	JUNCTION	0.07	1.92	5298.38	0	01:30
FG-4	JUNCTION	0.31	3.41	5294.82	0	01:31
FG-3	JUNCTION	0.28	2.98	5293.04	0	01:31
FG-2	JUNCTION	0.29	3.16	5289.34	0	01:33
FG-1	JUNCTION	0.22	3.27	5275.06	0	01:57
SP-1	OUTFALL	0.30	3.06	5225.98	0	01:36
RTPond	STORAGE	0.81	10.27	5307.50	0	02:03
NPond	STORAGE	0.63	8.27	5274.56	0	01:57
SPond	STORAGE	0.37	7.00	5274.50	0	01:55

Existing Conditions Model - 100-Year Storm

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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
SP-28	JUNCTION	170.00	170.00	0 01:30	4.206	4.206
SP-27	JUNCTION	0.00	170.71	0 01:30	0.000	4.206
SP-26	JUNCTION	0.00	170.29	0 01:31	0.000	4.206
SP-25	JUNCTION	0.00	169.45	0 01:31	0.000	4.207
SP-24/H-1	JUNCTION	80.00	245.84	0 01:32	1.689	5.950
SP-23	JUNCTION	0.00	229.50	0 01:40	0.000	5.897
SP-22	JUNCTION	7.30	234.50	0 01:40	0.095	14.839
SP-21	JUNCTION	0.00	108.06	0 02:52	0.000	13.068
SP-20	JUNCTION	0.00	151.58	0 02:56	0.000	21.471
SP-19	JUNCTION	0.00	151.58	0 02:56	0.000	21.474
SP-18	JUNCTION	0.00	151.59	0 02:56	0.000	21.474
SP-17	JUNCTION	35.00	152.16	0 02:52	0.499	21.974
SP-16	JUNCTION	0.00	152.16	0 02:52	0.000	21.974
SP-15	JUNCTION	20.00	156.10	0 02:46	0.865	22.534
SP-14	JUNCTION	0.00	156.10	0 02:46	0.000	22.534
SP-13	JUNCTION	20.00	167.67	0 01:33	0.811	23.346
SP-12	JUNCTION	0.00	167.67	0 01:33	0.000	23.347
SP-11	JUNCTION	0.00	167.67	0 01:33	0.000	23.347
SP-10	JUNCTION	20.00	187.65	0 01:33	0.897	24.245
SP-9	JUNCTION	0.00	187.62	0 01:33	0.000	24.245
SP-8	JUNCTION	0.00	186.94	0 01:34	0.000	24.246
SP-7	JUNCTION	0.00	186.57	0 01:34	0.000	24.246
SP-6	JUNCTION	0.00	184.58	0 01:35	0.000	24.246
SP-5	JUNCTION	0.00	184.91	0 01:35	0.000	24.246
SP-4	JUNCTION	75.00	260.01	0 01:35	1.269	25.515
SP-3	JUNCTION	0.00	260.18	0 01:35	0.000	25.515
H-5	JUNCTION	0.00	4.76	0 01:37	0.000	0.008
H-4	JUNCTION	0.00	10.82	0 01:36	0.000	0.034
H-3	JUNCTION	0.00	12.54	0 01:36	0.000	0.068
H-2	JUNCTION	0.00	12.53	0 01:36	0.000	0.095
A-2	JUNCTION	0.00	0.44	0 01:34	0.000	0.002
A-1	JUNCTION	0.00	1.17	0 01:34	0.000	0.007
FG-6/LA-1	JUNCTION	67.08	67.08	0 01:30	1.082	1.082
FG-5	JUNCTION	0.00	67.13	0 01:30	0.000	1.082
FG-4	JUNCTION	0.00	126.79	0 01:30	0.000	15.045
FG-3	JUNCTION	0.00	126.63	0 01:31	0.000	15.044
FG-2	JUNCTION	0.00	126.74	0 01:31	0.000	15.045
FG-1	JUNCTION	0.00	126.17	0 01:33	0.000	15.044
SP-1	OUTFALL	0.00	260.37	0 01:36	0.000	25.515
RTPond	STORAGE	764.16	764.16	0 01:42	15.890	15.890
NPond	STORAGE	25.90	205.04	0 01:31	0.148	15.867
SPond	STORAGE	59.19	199.99	0 01:34	0.946	10.192

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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
SP-26	JUNCTION	0.07	0.596	6.334
SP-25	JUNCTION	0.19	1.487	6.503
SP-24/H-1	JUNCTION	0.25	1.721	2.189
SP-23	JUNCTION	1.49	2.759	0.000
SP-22	JUNCTION	1.60	1.516	0.524
SP-21	JUNCTION	2.21	2.737	2.153
SP-20	JUNCTION	2.20	2.742	3.838

SP-19	JUNCTION	1.79	1.966	4.244
SP-18	JUNCTION	2.38	6.050	0.000
SP-17	JUNCTION	2.30	4.240	0.000
SP-16	JUNCTION	2.17	2.860	0.000
SP-15	JUNCTION	2.37	4.060	0.000
SP-14	JUNCTION	2.11	4.830	0.000
SP-13	JUNCTION	2.39	4.471	0.859
SP-12	JUNCTION	1.15	4.799	0.961
SP-11	JUNCTION	1.31	3.192	3.698
SP-10	JUNCTION	1.10	3.209	3.631
SP-9	JUNCTION	0.62	1.031	4.999
SP-8	JUNCTION	0.60	0.823	6.257
H-4	JUNCTION	0.08	0.492	3.408
H-3	JUNCTION	0.23	1.564	2.636
H-2	JUNCTION	0.36	2.520	2.000
A-2	JUNCTION	1.84	1.952	1.678
A-1	JUNCTION	1.56	1.431	0.609
RTPond	STORAGE	6.18	7.270	0.000
NPond	STORAGE	1.62	1.582	2.438

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Node Flooding Summary
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Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum Rate CFS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 gal	Maximum Ponded Depth Feet
SP-18	0.01	28.75	0 01:32	0.000	10.55
SP-17	0.01	25.88	0 01:32	0.000	8.74
SP-16	0.72	23.94	0 01:56	0.306	7.36
SP-15	0.01	8.43	0 01:31	0.000	8.56
SP-14	0.01	4.16	0 01:31	0.000	9.33
RTPond	0.64	340.34	0 02:03	1.928	10.27
SPond	0.38	143.29	0 01:58	0.667	7.00

****
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
RTPond	60.006	5	0	1232.796	100	0 02:03	83.20
NPond	12.158	4	0	239.991	70	0 01:57	127.69
SPond	7.609	3	0	234.581	100	0 01:55	98.21

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
SP-1	40.25	32.84	260.37	25.515
System	40.25	32.84	260.37	25.515

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Link Flow Summary
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Existing Conditions Model - 100-Year Storm

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days	hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
SP-28/27	CONDUIT	170.71	0	01:30	10.36	0.56	0.85
SP-27/26	CONDUIT	170.29	0	01:31	9.61	0.79	1.00
SP-26/25	CONDUIT	169.45	0	01:31	9.37	0.74	1.00
SP-25/24	CONDUIT	166.35	0	01:43	9.31	0.81	1.00
SP-24/23	CONDUIT	229.50	0	01:40	9.33	0.96	1.00
SP-23/22	CONDUIT	229.50	0	01:40	9.27	1.08	1.00
SP-22/21	CONDUIT	108.06	0	02:52	5.81	0.81	1.00
SP-21/20	CONDUIT	108.06	0	02:52	5.50	0.98	1.00
SP-20/19	CONDUIT	151.58	0	02:56	10.38	4.41	1.00
SP-19/18	CONDUIT	151.59	0	02:56	10.97	0.52	1.00
SP-18/17	CONDUIT	151.59	0	02:56	9.53	1.09	1.00
SP-17/16	CONDUIT	152.16	0	02:52	9.98	1.11	1.00
SP-16/15	CONDUIT	152.16	0	02:52	10.00	0.92	1.00
SP-15/14	CONDUIT	156.10	0	02:46	9.83	1.08	1.00
SP-14/13	CONDUIT	156.11	0	02:45	9.82	0.97	1.00
SP-13/12	CONDUIT	167.67	0	01:33	10.54	1.34	1.00
SP-12/11	CONDUIT	167.67	0	01:33	10.54	0.96	1.00
SP-11/10	CONDUIT	167.65	0	01:33	10.54	1.02	1.00
SP-10/9	CONDUIT	187.62	0	01:33	11.89	1.30	1.00
SP-9/8	CONDUIT	186.94	0	01:34	11.92	0.98	1.00
SP-8/7	CONDUIT	186.57	0	01:34	11.89	1.07	0.97
SP-7/6	CONDUIT	184.58	0	01:35	13.17	1.10	0.83
SP-6/5	CONDUIT	184.91	0	01:35	15.14	0.79	0.74
SP-5/4	CONDUIT	185.08	0	01:42	12.61	0.63	0.79
SP-4/3	CONDUIT	260.18	0	01:35	15.98	1.27	0.78
SP-3/1	CONDUIT	260.37	0	01:36	20.07	0.69	0.63
H-5/4	CONDUIT	4.76	0	01:37	1.26	0.07	0.89
H-4/3	CONDUIT	10.82	0	01:36	1.24	0.16	1.00
H-3/2	CONDUIT	12.54	0	01:36	1.50	0.18	1.00
H-2/1	CONDUIT	12.53	0	01:36	1.52	0.23	1.00
A-2/1	CONDUIT	0.44	0	01:34	0.68	0.01	1.00
A-1/SPond	CONDUIT	1.17	0	01:34	0.47	0.01	1.00
FG-6/5	CONDUIT	67.13	0	01:30	11.28	0.44	0.48
FG-5/4	CONDUIT	66.49	0	01:30	7.55	0.46	0.66
FG-4/3	CONDUIT	126.63	0	01:31	11.78	1.01	0.80
FG-3/2	CONDUIT	126.74	0	01:31	12.37	0.84	0.77
FG-2/1	CONDUIT	126.17	0	01:33	14.87	0.88	0.72
FG-1/NPond	CONDUIT	125.61	0	01:33	22.20	0.37	0.91
RTPond/FG-4	CONDUIT	83.20	0	02:38	11.91	1.62	0.96
SPond/NPond	CONDUIT	87.24	0	01:58	4.11	0.17	1.00
SPond/SP-22	CONDUIT	150.81	0	01:37	7.14	0.07	0.99
NPond/SP-20	CONDUIT	43.52	0	02:57	8.87	1.49	1.00

****
Flow Classification Summary
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Conduit	Adjusted /Actual Length	--- Fraction of Time in Flow Class --- Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
SP-28/27	1.00	0.65	0.00	0.00	0.02	0.32	0.00	0.00	0.38	0.0000
SP-27/26	1.00	0.65	0.00	0.00	0.21	0.13	0.00	0.00	0.34	0.0000
SP-26/25	1.00	0.65	0.00	0.00	0.32	0.03	0.00	0.00	0.32	0.0000
SP-25/24	1.00	0.65	0.00	0.00	0.04	0.31	0.00	0.00	0.37	0.0000
SP-24/23	1.00	0.64	0.00	0.00	0.07	0.29	0.00	0.00	0.35	0.0000
SP-23/22	1.00	0.63	0.01	0.00	0.35	0.00	0.00	0.00	0.17	0.0000
SP-22/21	1.00	0.63	0.00	0.00	0.37	0.00	0.00	0.00	0.21	0.0000
SP-21/20	1.00	0.01	0.62	0.00	0.37	0.00	0.00	0.00	0.12	0.0000
SP-20/19	1.00	0.01	0.00	0.00	0.70	0.29	0.00	0.00	0.36	0.0000
SP-19/18	1.00	0.01	0.00	0.00	0.66	0.33	0.00	0.00	0.54	0.0000
SP-18/17	1.00	0.01	0.00	0.00	0.70	0.29	0.00	0.00	0.37	0.0000
SP-17/16	1.00	0.01	0.00	0.00	0.68	0.31	0.00	0.00	0.42	0.0000
SP-16/15	1.00	0.01	0.00	0.00	0.68	0.31	0.00	0.00	0.42	0.0000

SP-15/14	1.00	0.01	0.00	0.00	0.68	0.31	0.00	0.00	0.42	0.0000
SP-14/13	1.00	0.01	0.00	0.00	0.70	0.29	0.00	0.00	0.38	0.0000
SP-13/12	1.00	0.01	0.00	0.00	0.68	0.31	0.00	0.00	0.42	0.0000
SP-12/11	1.00	0.01	0.00	0.00	0.66	0.33	0.00	0.00	0.47	0.0000
SP-11/10	1.00	0.01	0.00	0.00	0.68	0.31	0.00	0.00	0.42	0.0000
SP-10/9	1.00	0.01	0.00	0.00	0.65	0.34	0.00	0.00	0.48	0.0000
SP-9/8	1.00	0.01	0.00	0.00	0.63	0.36	0.00	0.00	0.54	0.0000
SP-8/7	1.00	0.01	0.00	0.00	0.64	0.35	0.00	0.00	0.51	0.0000
SP-7/6	1.00	0.01	0.00	0.00	0.61	0.38	0.00	0.00	0.58	0.0000
SP-6/5	1.00	0.01	0.00	0.00	0.60	0.39	0.00	0.00	0.72	0.0000
SP-5/4	1.00	0.01	0.00	0.00	0.62	0.37	0.00	0.00	0.54	0.0000
SP-4/3	1.00	0.01	0.58	0.00	0.04	0.38	0.00	0.00	0.62	0.0001
SP-3/1	1.00	0.01	0.00	0.00	0.58	0.41	0.00	0.00	0.91	0.0000
H-5/4	1.00	0.98	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.0000
H-4/3	1.00	0.98	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.0000
H-3/2	1.00	0.02	0.96	0.00	0.02	0.00	0.00	0.00	0.00	0.0000
H-2/1	1.00	0.02	0.00	0.00	0.02	0.00	0.00	0.96	0.00	0.0000
A-2/1	1.00	0.91	0.03	0.00	0.07	0.00	0.00	0.00	0.00	0.0000
A-1/SPond	1.00	0.90	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.0000
FG-6/5	1.00	0.66	0.01	0.00	0.00	0.33	0.00	0.00	0.46	0.0000
FG-5/4	1.00	0.01	0.65	0.00	0.34	0.00	0.00	0.00	0.12	0.0000
FG-4/3	1.00	0.01	0.00	0.00	0.64	0.35	0.00	0.00	0.50	0.0000
FG-3/2	1.00	0.01	0.00	0.00	0.64	0.35	0.00	0.00	0.51	0.0000
FG-2/1	1.00	0.01	0.00	0.00	0.64	0.35	0.00	0.00	0.69	0.0000
FG-1/NPond	1.00	0.01	0.00	0.00	0.03	0.02	0.00	0.94	1.10	0.0000
RTPond/FG-4	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.39	0.0000
SPond/NPond	1.00	0.01	0.00	0.00	0.13	0.00	0.00	0.86	0.28	0.0000
SPond/SP-22	1.00	0.63	0.27	0.00	0.10	0.00	0.00	0.00	0.03	0.0000
NPond/SP-20	1.00	0.01	0.00	0.00	0.36	0.00	0.00	0.63	0.21	0.0007

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
SP-26/25	0.07	0.07	0.07	0.01	0.01
SP-25/24	0.19	0.19	0.19	0.01	0.01
SP-24/23	0.45	0.45	0.45	0.63	0.21
SP-23/22	1.48	1.48	1.48	0.67	0.22
SP-22/21	2.10	2.10	2.10	0.01	0.01
SP-21/20	2.19	2.19	2.19	0.01	1.83
SP-20/19	1.79	1.79	1.79	6.84	1.79
SP-19/18	1.79	1.79	1.79	0.01	0.01
SP-18/17	2.29	2.29	2.29	2.16	2.06
SP-17/16	2.17	2.17	2.17	2.45	2.14
SP-16/15	2.17	2.17	2.17	0.01	0.01
SP-15/14	2.11	2.11	2.11	1.98	2.11
SP-14/13	2.11	2.11	2.11	0.01	1.39
SP-13/12	1.15	1.15	1.15	2.86	1.15
SP-12/11	1.15	1.15	1.15	0.01	0.89
SP-11/10	1.10	1.10	1.10	0.09	1.10
SP-10/9	0.62	0.62	0.62	2.63	0.62
SP-9/8	0.60	0.60	0.60	0.01	0.60
SP-8/7	0.01	0.01	0.01	0.80	0.01
SP-7/6	0.01	0.01	0.01	1.00	0.01
SP-4/3	0.01	0.01	0.01	0.44	0.01
H-4/3	0.08	0.08	0.08	0.01	0.01
H-3/2	0.23	0.23	0.23	0.01	0.01
H-2/1	0.36	0.36	0.36	0.01	0.01
A-2/1	1.84	1.84	1.84	0.01	0.01
A-1/SPond	1.56	1.56	1.56	0.01	0.01
FG-4/3	0.01	0.01	0.01	0.05	0.01
RTPond/FG-4	0.01	0.01	0.01	6.31	0.01
SPond/NPond	1.30	1.30	1.30	0.01	0.01
NPond/SP-20	5.98	5.98	5.98	5.85	5.93

Existing Conditions Model - 100-Year Storm

```
Analysis begun on:  Wed Jun 26 14:08:53 2013
Analysis ended on:  Wed Jun 26 14:09:09 2013
Total elapsed time: 00:00:16
```

Option 1 - 100-Year Storm

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

Option 1 - 100-Year Storm
Louisiana and Lomas Storm Drain Improvements, COA Project No. 730491
Build vertical walls at racetrack pond.

***********************************************************
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 ........ YES
  Water Quality .......... NO
Flow Routing Method ...... DYNWAVE
Starting Date ............ APR-01-2013 00:00:00
Ending Date .............. APR-04-2013 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:00:15
Routing Time Step ........ 1.00 sec


*************
Element Count
*************
Number of rain gages ...... 0
Number of subcatchments ... 0
Number of nodes ........... 42
Number of links ........... 42
Number of pollutants ...... 0
Number of land uses ....... 0


************
Node Summary
************
                                 Invert      Max.    Ponded    External
Name                Type          Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------
SP-28               JUNCTION     5280.18      6.13       0.0    Yes
SP-27               JUNCTION     5277.74      9.86       0.0
SP-26               JUNCTION     5276.24     12.43       0.0
SP-25               JUNCTION     5273.95     13.49       0.0
SP-24/H-1           JUNCTION     5272.76      9.41       0.0    Yes
SP-23               JUNCTION     5269.53      6.40       0.0
SP-22               JUNCTION     5266.99      8.04       0.0    Yes
SP-21               JUNCTION     5266.30      9.89       0.0
SP-20               JUNCTION     5265.84     11.58       0.0
SP-19               JUNCTION     5265.79     10.71       0.0
SP-18               JUNCTION     5263.27     10.55       0.0
SP-17               JUNCTION     5261.57      8.74       0.0    Yes
SP-16               JUNCTION     5260.10      7.36       0.0
SP-15               JUNCTION     5257.62      8.56       0.0    Yes
SP-14               JUNCTION     5255.73      9.33       0.0
SP-13               JUNCTION     5253.70      9.83       0.0    Yes
SP-12               JUNCTION     5252.29     10.26       0.0
SP-11               JUNCTION     5249.84     11.39       0.0
SP-10               JUNCTION     5249.22     11.34       0.0    Yes
SP-9                JUNCTION     5247.42     10.53       0.0
SP-8                JUNCTION     5244.68     11.58       0.0
SP-7                JUNCTION     5242.35     12.26       0.0
```

SP-6	JUNCTION	5239.75	11.67	0.0	
SP-5	JUNCTION	5236.42	11.96	0.0	
SP-4	JUNCTION	5232.86	12.14	0.0	Yes
SP-3	JUNCTION	5231.86	19.57	0.0	
H-5	JUNCTION	5277.23	9.25	0.0	
H-4	JUNCTION	5276.05	7.40	0.0	
H-3	JUNCTION	5274.96	7.70	0.0	
H-2	JUNCTION	5273.98	8.02	0.0	
A-2	JUNCTION	5269.55	6.63	0.0	
A-1	JUNCTION	5269.07	6.04	0.0	
FG-6/LA-1	JUNCTION	5299.95	9.65	0.0	Yes
FG-5	JUNCTION	5296.46	9.00	0.0	
FG-4	JUNCTION	5291.41	7.38	0.0	
FG-3	JUNCTION	5290.06	8.30	0.0	
FG-2	JUNCTION	5286.18	7.72	0.0	
FG-1	JUNCTION	5271.79	6.85	0.0	
SP-1	OUTFALL	5222.92	5.00	0.0	
RTPond	STORAGE	5297.23	10.27	0.0	Yes
NPond	STORAGE	5266.29	10.71	0.0	Yes
SPond	STORAGE	5267.50	7.00	0.0	Yes

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
SP-28/27	SP-28	SP-27	CONDUIT	296.0	0.8244	0.0130
SP-27/26	SP-27	SP-26	CONDUIT	362.0	0.4144	0.0130
SP-26/25	SP-26	SP-25	CONDUIT	497.0	0.4608	0.0130
SP-25/24	SP-25	SP-24/H-1	CONDUIT	321.0	0.3707	0.0130
SP-24/23	SP-24/H-1	SP-23	CONDUIT	468.0	0.6902	0.0130
SP-23/22	SP-23	SP-22	CONDUIT	467.0	0.5439	0.0130
SP-22/21	SP-22	SP-21	CONDUIT	263.0	0.2624	0.0130
SP-21/20	SP-21	SP-20	CONDUIT	255.0	0.1804	0.0130
SP-20/19	SP-20	SP-19	CONDUIT	164.0	0.0305	0.0130
SP-19/18	SP-19	SP-18	CONDUIT	114.0	2.2111	0.0130
SP-18/17	SP-18	SP-17	CONDUIT	338.0	0.5030	0.0130
SP-17/16	SP-17	SP-16	CONDUIT	304.0	0.4836	0.0130
SP-16/15	SP-16	SP-15	CONDUIT	354.0	0.7006	0.0130
SP-15/14	SP-15	SP-14	CONDUIT	350.0	0.5400	0.0130
SP-14/13	SP-14	SP-13	CONDUIT	301.0	0.6744	0.0130
SP-13/12	SP-13	SP-12	CONDUIT	349.0	0.4040	0.0130
SP-12/11	SP-12	SP-11	CONDUIT	313.0	0.7828	0.0130
SP-11/10	SP-11	SP-10	CONDUIT	88.0	0.7046	0.0130
SP-10/9	SP-10	SP-9	CONDUIT	335.0	0.5373	0.0130
SP-9/8	SP-9	SP-8	CONDUIT	291.0	0.9416	0.0130
SP-8/7	SP-8	SP-7	CONDUIT	295.0	0.7899	0.0130
SP-7/6	SP-7	SP-6	CONDUIT	357.0	0.7283	0.0130
SP-6/5	SP-6	SP-5	CONDUIT	235.0	1.4172	0.0130
SP-5/4	SP-5	SP-4	CONDUIT	276.0	1.2900	0.0130
SP-4/3	SP-4	SP-3	CONDUIT	162.0	0.6173	0.0130
SP-3/1	SP-3	SP-1	CONDUIT	430.0	2.0795	0.0130
H-5/4	H-5	H-4	CONDUIT	248.0	0.4758	0.0130
H-4/3	H-4	H-3	CONDUIT	230.0	0.4739	0.0130
H-3/2	H-3	H-2	CONDUIT	203.0	0.4828	0.0130
H-2/1	H-2	SP-24/H-1	CONDUIT	82.0	0.3049	0.0130
A-2/1	A-2	A-1	CONDUIT	36.0	1.0278	0.0130
A-1/SPond	A-1	SPond	CONDUIT	31.9	1.5025	0.0130
FG-6/5	FG-6/LA-1	FG-5	CONDUIT	311.0	1.1223	0.0130
FG-5/4	FG-5	FG-4	CONDUIT	509.0	0.9922	0.0130
FG-4/3	FG-4	FG-3	CONDUIT	177.6	0.7602	0.0130
FG-3/2	FG-3	FG-2	CONDUIT	348.3	1.1141	0.0130
FG-2/1	FG-2	FG-1	CONDUIT	1438.0	1.0007	0.0130
FG-1/NPond	FG-1	NPond	CONDUIT	59.0	5.5339	0.0130
RTPond-FG-4	RTPond	FG-4	CONDUIT	753.0	0.5897	0.0130
SPond/NPond	SPond	NPond	CONDUIT	135.3	0.3843	0.0130
SPond/SP-22	SPond	SP-22	CONDUIT	21.0	7.5932	0.0130
NPond/SP-20	NPond	SP-20	CONDUIT	66.9	0.5085	0.0130

****

Option 1 - 100-Year Storm

Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
SP-28/27	CIRCULAR	5.50	23.76	1.38	5.50	1	304.89
SP-27/26	CIRCULAR	5.50	23.76	1.38	5.50	1	216.17
SP-26/25	CIRCULAR	5.50	23.76	1.38	5.50	1	227.95
SP-25/24	CIRCULAR	5.50	23.76	1.38	5.50	1	204.46
SP-24/23	CIRCULAR	4.00	12.57	1.00	4.00	2	119.34
SP-23/22	CIRCULAR	4.00	12.57	1.00	4.00	2	105.94
SP-22/21	CIRCULAR	5.00	19.63	1.25	5.00	1	133.40
SP-21/20	CIRCULAR	5.00	19.63	1.25	5.00	1	110.62
SP-20/19	CIRCULAR	4.50	15.90	1.13	4.50	1	34.34
SP-19/18	CIRCULAR	4.50	15.90	1.13	4.50	1	292.41
SP-18/17	CIRCULAR	4.50	15.90	1.13	4.50	1	139.46
SP-17/16	CIRCULAR	4.50	15.90	1.13	4.50	1	136.75
SP-16/15	CIRCULAR	4.50	15.90	1.13	4.50	1	164.60
SP-15/14	CIRCULAR	4.50	15.90	1.13	4.50	1	144.51
SP-14/13	CIRCULAR	4.50	15.90	1.13	4.50	1	161.50
SP-13/12	CIRCULAR	4.50	15.90	1.13	4.50	1	124.99
SP-12/11	CIRCULAR	4.50	15.90	1.13	4.50	1	173.98
SP-11/10	CIRCULAR	4.50	15.90	1.13	4.50	1	165.06
SP-10/9	CIRCULAR	4.50	15.90	1.13	4.50	1	144.15
SP-9/8	CIRCULAR	4.50	15.90	1.13	4.50	1	190.82
SP-8/7	CIRCULAR	4.50	15.90	1.13	4.50	1	174.77
SP-7/6	CIRCULAR	4.50	15.90	1.13	4.50	1	167.82
SP-6/5	CIRCULAR	4.50	15.90	1.13	4.50	1	234.10
SP-5/4	CIRCULAR	5.00	19.63	1.25	5.00	1	295.80
SP-4/3	CIRCULAR	5.00	19.63	1.25	5.00	1	204.62
SP-3/1	CIRCULAR	5.00	19.63	1.25	5.00	1	375.57
H-5/4	CIRCULAR	3.50	9.62	0.88	3.50	1	69.40
H-4/3	CIRCULAR	3.50	9.62	0.88	3.50	1	69.26
H-3/2	CIRCULAR	3.50	9.62	0.88	3.50	1	69.90
H-2/1	CIRCULAR	3.50	9.62	0.88	3.50	1	55.55
A-2/1	CIRCULAR	3.00	7.07	0.75	3.00	1	67.62
A-1/SPond	CIRCULAR	4.00	12.57	1.00	4.00	1	176.07
FG-6/5	CIRCULAR	4.00	12.57	1.00	4.00	1	152.17
FG-5/4	CIRCULAR	4.00	12.57	1.00	4.00	1	143.08
FG-4/3	CIRCULAR	4.00	12.57	1.00	4.00	1	125.24
FG-3/2	CIRCULAR	4.00	12.57	1.00	4.00	1	151.62
FG-2/1	CIRCULAR	4.00	12.57	1.00	4.00	1	143.70
FG-1/NPond	CIRCULAR	4.00	12.57	1.00	4.00	1	337.91
RTPond-FG-4	CIRCULAR	3.00	7.07	0.75	3.00	1	51.22
SPond/NPond	CIRCULAR	6.00	28.27	1.50	6.00	2	262.55
SPond/SP-22	RECT_CLOSED	6.00	48.00	1.71	8.00	1	2165.64
NPond/SP-20	CIRCULAR	2.50	4.91	0.63	2.50	1	29.25

****
Control Actions Taken
****

********** Flow Routing Continuity **********	Volume acre-feet	Volume 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	87.157	28.401
External Outflow	84.966	27.688
Internal Outflow	2.236	0.729
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-0.052	

****

Option 1 - 100-Year Storm

Time-Step Critical Elements
****
None

****
Highest Flow Instability Indexes
****
Link NPond/SP-20 (7)

****
Routing Time Step Summary
****
Minimum Time Step : 0.50 sec
Average Time Step : 1.00 sec
Maximum Time Step : 1.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.01

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days	hr:min
SP-28	JUNCTION	0.13	3.68	5283.86	0	01:42
SP-27	JUNCTION	0.16	5.11	5282.85	0	01:42
SP-26	JUNCTION	0.16	5.68	5281.92	0	01:42
SP-25	JUNCTION	0.17	6.59	5280.54	0	01:42
SP-24/H-1	JUNCTION	0.16	6.85	5279.61	0	01:43
SP-23	JUNCTION	0.24	6.57	5276.10	0	01:45
SP-22	JUNCTION	0.49	7.51	5274.50	0	01:59
SP-21	JUNCTION	0.54	7.73	5274.03	0	02:00
SP-20	JUNCTION	0.64	7.73	5273.57	0	02:00
SP-19	JUNCTION	0.41	6.46	5272.25	0	02:00
SP-18	JUNCTION	0.57	10.55	5273.82	0	01:33
SP-17	JUNCTION	0.56	8.74	5270.31	0	01:33
SP-16	JUNCTION	0.52	7.36	5267.46	0	01:33
SP-15	JUNCTION	0.56	8.56	5266.18	0	01:32
SP-14	JUNCTION	0.53	9.00	5264.73	0	01:33
SP-13	JUNCTION	0.57	9.83	5263.53	0	01:33
SP-12	JUNCTION	0.48	9.48	5261.77	0	01:33
SP-11	JUNCTION	0.51	8.29	5258.13	0	01:33
SP-10	JUNCTION	0.51	7.33	5256.55	0	01:33
SP-9	JUNCTION	0.43	5.51	5252.93	0	01:35
SP-8	JUNCTION	0.45	5.27	5249.95	0	01:35
SP-7	JUNCTION	0.45	4.18	5246.53	0	01:35
SP-6	JUNCTION	0.38	3.30	5243.05	0	01:35
SP-5	JUNCTION	0.37	3.34	5239.76	0	01:36
SP-4	JUNCTION	0.45	4.56	5237.42	0	01:35
SP-3	JUNCTION	0.33	3.23	5235.09	0	01:36
H-5	JUNCTION	0.01	2.46	5279.69	0	01:43
H-4	JUNCTION	0.02	3.64	5279.69	0	01:43
H-3	JUNCTION	0.03	4.69	5279.65	0	01:43
H-2	JUNCTION	0.04	5.64	5279.62	0	01:43
A-2	JUNCTION	0.14	4.95	5274.50	0	01:59
A-1	JUNCTION	0.18	5.43	5274.50	0	01:59
FG-6/LA-1	JUNCTION	0.07	1.93	5301.88	0	01:30
FG-5	JUNCTION	0.07	1.92	5298.38	0	01:30
FG-4	JUNCTION	0.35	3.22	5294.63	0	01:31
FG-3	JUNCTION	0.31	2.82	5292.88	0	01:31
FG-2	JUNCTION	0.33	2.99	5289.17	0	01:33
FG-1	JUNCTION	0.24	3.21	5275.00	0	02:00
SP-1	OUTFALL	0.32	3.06	5225.98	0	01:36
RTPond	STORAGE	0.81	9.84	5307.07	0	02:42
NPond	STORAGE	0.69	8.26	5274.55	0	02:00
SPond	STORAGE	0.41	7.00	5274.50	0	01:59

Option 1 - 100-Year Storm

****
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
SP-28	JUNCTION	170.00	170.00	0	01:30	4.206	4.206
SP-27	JUNCTION	0.00	170.71	0	01:30	0.000	4.206
SP-26	JUNCTION	0.00	170.29	0	01:31	0.000	4.206
SP-25	JUNCTION	0.00	169.49	0	01:31	0.000	4.206
SP-24/H-1	JUNCTION	80.00	246.23	0	01:32	1.689	5.948
SP-23	JUNCTION	0.00	230.22	0	01:32	0.000	5.896
SP-22	JUNCTION	7.30	233.76	0	01:39	0.095	15.676
SP-21	JUNCTION	0.00	107.99	0	02:51	0.000	13.900
SP-20	JUNCTION	0.00	151.46	0	02:56	0.000	23.618
SP-19	JUNCTION	0.00	151.46	0	02:56	0.000	23.621
SP-18	JUNCTION	0.00	151.47	0	02:56	0.000	23.621
SP-17	JUNCTION	35.00	152.06	0	02:52	0.499	24.121
SP-16	JUNCTION	0.00	152.06	0	02:52	0.000	24.122
SP-15	JUNCTION	20.00	156.05	0	02:45	0.865	24.705
SP-14	JUNCTION	0.00	156.05	0	02:45	0.000	24.705
SP-13	JUNCTION	20.00	167.36	0	01:34	0.811	25.517
SP-12	JUNCTION	0.00	167.36	0	01:34	0.000	25.517
SP-11	JUNCTION	0.00	167.37	0	01:34	0.000	25.518
SP-10	JUNCTION	20.00	187.37	0	01:34	0.897	26.415
SP-9	JUNCTION	0.00	187.36	0	01:34	0.000	26.416
SP-8	JUNCTION	0.00	186.78	0	01:35	0.000	26.416
SP-7	JUNCTION	0.00	186.45	0	01:35	0.000	26.416
SP-6	JUNCTION	0.00	184.53	0	01:36	0.000	26.416
SP-5	JUNCTION	0.00	184.74	0	01:36	0.000	26.416
SP-4	JUNCTION	75.00	259.17	0	01:35	1.269	27.685
SP-3	JUNCTION	0.00	259.48	0	01:36	0.000	27.685
H-5	JUNCTION	0.00	3.97	0	01:38	0.000	0.007
H-4	JUNCTION	0.00	10.17	0	01:37	0.000	0.032
H-3	JUNCTION	0.00	11.74	0	01:37	0.000	0.066
H-2	JUNCTION	0.00	11.74	0	01:37	0.000	0.093
A-2	JUNCTION	0.00	0.45	0	01:34	0.000	0.002
A-1	JUNCTION	0.00	1.21	0	01:34	0.000	0.007
FG-6/LA-1	JUNCTION	67.09	67.09	0	01:30	1.082	1.082
FG-5	JUNCTION	0.00	67.13	0	01:30	0.000	1.082
FG-4	JUNCTION	0.00	118.85	0	01:31	0.000	16.973
FG-3	JUNCTION	0.00	118.86	0	01:31	0.000	16.972
FG-2	JUNCTION	0.00	118.97	0	01:32	0.000	16.972
FG-1	JUNCTION	0.00	118.32	0	01:33	0.000	16.972
SP-1	OUTFALL	0.00	259.80	0	01:36	0.000	27.685
RTPond	STORAGE	764.14	764.14	0	01:42	15.890	15.890
NPond	STORAGE	25.90	209.55	0	01:31	0.148	17.870
SPond	STORAGE	59.19	198.00	0	01:34	0.946	10.887

****
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
SP-26	JUNCTION	0.04	0.175	6.755
SP-25	JUNCTION	0.17	1.090	6.900
SP-24/H-1	JUNCTION	0.23	1.350	2.560
SP-23	JUNCTION	1.46	2.573	0.000
SP-22	JUNCTION	1.55	1.512	0.528
SP-21	JUNCTION	2.16	2.732	2.158

SP-20	JUNCTION	2.15	2.735	3.845
SP-19	JUNCTION	1.75	1.955	4.255
SP-18	JUNCTION	2.33	6.050	0.000
SP-17	JUNCTION	2.25	4.240	0.000
SP-16	JUNCTION	2.13	2.860	0.000
SP-15	JUNCTION	2.32	4.060	0.000
SP-14	JUNCTION	2.07	4.498	0.332
SP-13	JUNCTION	2.35	5.330	0.000
SP-12	JUNCTION	1.14	4.980	0.780
SP-11	JUNCTION	1.30	3.785	3.105
SP-10	JUNCTION	1.09	2.829	4.011
SP-9	JUNCTION	0.61	1.014	5.016
SP-8	JUNCTION	0.59	0.769	6.311
H-4	JUNCTION	0.04	0.136	3.764
H-3	JUNCTION	0.21	1.193	3.007
H-2	JUNCTION	0.34	2.143	2.377
A-2	JUNCTION	1.79	1.952	1.678
A-1	JUNCTION	1.52	1.431	0.609
RTPond	STORAGE	6.95	6.836	0.434
NPond	STORAGE	1.57	1.573	2.447

****
Node Flooding Summary
****

Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum Rate CFS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 gal	Maximum Ponded Depth Feet
SP-18	0.01	26.84	0 01:33	0.000	10.55
SP-17	0.01	23.30	0 01:33	0.000	8.74
SP-16	0.71	23.32	0 02:00	0.282	7.36
SP-15	0.01	8.09	0 01:32	0.000	8.56
SP-13	0.01	1.77	0 01:33	0.000	9.83
SPond	0.31	116.77	0 02:01	0.446	7.00

****
Storage Volume Summary
****

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
RTPond	90.229	5	0	1532.074	87	0 02:42	81.76
NPond	13.461	4	0	239.620	70	0 02:00	118.48
SPond	7.954	3	0	234.581	100	0 01:59	100.41

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
SP-1	42.10	34.06	259.80	27.685
System	42.10	34.06	259.80	27.685

****
Link Flow Summary
****

Option 1 - 100-Year Storm

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days	hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
SP-28/27	CONDUIT	170.71	0	01:30	10.36	0.56	0.80
SP-27/26	CONDUIT	170.29	0	01:31	9.61	0.79	0.96
SP-26/25	CONDUIT	169.49	0	01:31	9.37	0.74	1.00
SP-25/24	CONDUIT	166.23	0	01:32	9.32	0.81	1.00
SP-24/23	CONDUIT	230.22	0	01:32	9.35	0.96	1.00
SP-23/22	CONDUIT	228.78	0	01:40	9.42	1.08	1.00
SP-22/21	CONDUIT	107.99	0	02:51	5.86	0.81	1.00
SP-21/20	CONDUIT	108.00	0	02:51	5.51	0.98	1.00
SP-20/19	CONDUIT	151.46	0	02:56	10.38	4.41	1.00
SP-19/18	CONDUIT	151.47	0	02:56	10.97	0.52	1.00
SP-18/17	CONDUIT	151.47	0	02:56	9.52	1.09	1.00
SP-17/16	CONDUIT	152.06	0	02:52	9.97	1.11	1.00
SP-16/15	CONDUIT	152.06	0	02:52	10.00	0.92	1.00
SP-15/14	CONDUIT	156.05	0	02:45	9.83	1.08	1.00
SP-14/13	CONDUIT	156.05	0	02:45	9.81	0.97	1.00
SP-13/12	CONDUIT	167.36	0	01:34	10.52	1.34	1.00
SP-12/11	CONDUIT	167.37	0	01:34	10.52	0.96	1.00
SP-11/10	CONDUIT	167.37	0	01:34	10.52	1.01	1.00
SP-10/9	CONDUIT	187.36	0	01:34	11.92	1.30	1.00
SP-9/8	CONDUIT	186.78	0	01:35	11.92	0.98	1.00
SP-8/7	CONDUIT	186.45	0	01:35	11.89	1.07	0.96
SP-7/6	CONDUIT	184.53	0	01:36	13.17	1.10	0.83
SP-6/5	CONDUIT	184.74	0	01:36	15.14	0.79	0.74
SP-5/4	CONDUIT	185.23	0	01:42	12.61	0.63	0.79
SP-4/3	CONDUIT	259.48	0	01:36	15.94	1.27	0.78
SP-3/1	CONDUIT	259.80	0	01:36	20.06	0.69	0.63
H-5/4	CONDUIT	3.97	0	01:38	1.06	0.06	0.85
H-4/3	CONDUIT	10.17	0	01:37	1.19	0.15	1.00
H-3/2	CONDUIT	11.74	0	01:37	1.50	0.17	1.00
H-2/1	CONDUIT	11.74	0	01:37	1.52	0.21	1.00
A-2/1	CONDUIT	0.45	0	01:34	0.61	0.01	1.00
A-1/SPond	CONDUIT	1.21	0	01:34	0.45	0.01	1.00
FG-6/5	CONDUIT	67.13	0	01:30	11.28	0.44	0.48
FG-5/4	CONDUIT	66.48	0	01:30	7.96	0.46	0.64
FG-4/3	CONDUIT	118.86	0	01:31	11.70	0.95	0.75
FG-3/2	CONDUIT	118.97	0	01:32	12.27	0.78	0.72
FG-2/1	CONDUIT	118.32	0	01:33	14.79	0.82	0.70
FG-1/NPond	CONDUIT	118.17	0	01:33	21.86	0.35	0.90
RTPond-FG-4	CONDUIT	81.76	0	02:42	11.71	1.60	0.96
SPond/NPond	CONDUIT	99.54	0	01:31	5.18	0.19	1.00
SPond/SP-22	CONDUIT	151.32	0	01:38	7.45	0.07	0.99
NPond/SP-20	CONDUIT	43.48	0	02:56	8.86	1.49	1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
SP-28/27	1.00	0.65	0.00	0.00	0.02	0.33	0.00	0.00	0.38	0.0000
SP-27/26	1.00	0.65	0.00	0.00	0.21	0.13	0.00	0.00	0.34	0.0000
SP-26/25	1.00	0.65	0.00	0.00	0.32	0.03	0.00	0.00	0.32	0.0000
SP-25/24	1.00	0.65	0.00	0.00	0.04	0.31	0.00	0.00	0.37	0.0000
SP-24/23	1.00	0.64	0.00	0.00	0.07	0.29	0.00	0.00	0.35	0.0000
SP-23/22	1.00	0.63	0.01	0.00	0.35	0.00	0.00	0.00	0.16	0.0000
SP-22/21	1.00	0.63	0.01	0.00	0.37	0.00	0.00	0.00	0.21	0.0000
SP-21/20	1.00	0.01	0.62	0.00	0.37	0.00	0.00	0.00	0.11	0.0000
SP-20/19	1.00	0.01	0.00	0.00	0.70	0.29	0.00	0.00	0.37	0.0000
SP-19/18	1.00	0.01	0.00	0.00	0.64	0.35	0.00	0.00	0.56	0.0000
SP-18/17	1.00	0.01	0.00	0.00	0.70	0.29	0.00	0.00	0.39	0.0000
SP-17/16	1.00	0.01	0.00	0.00	0.67	0.32	0.00	0.00	0.44	0.0000
SP-16/15	1.00	0.01	0.00	0.00	0.67	0.32	0.00	0.00	0.44	0.0000

SP-15/14	1.00	0.01	0.00	0.00	0.67	0.32	0.00	0.00	0.44	0.0000
SP-14/13	1.00	0.01	0.00	0.00	0.69	0.30	0.00	0.00	0.40	0.0000
SP-13/12	1.00	0.01	0.00	0.00	0.68	0.31	0.00	0.00	0.44	0.0000
SP-12/11	1.00	0.01	0.00	0.00	0.65	0.34	0.00	0.00	0.49	0.0000
SP-11/10	1.00	0.01	0.00	0.00	0.68	0.31	0.00	0.00	0.43	0.0000
SP-10/9	1.00	0.01	0.00	0.00	0.65	0.34	0.00	0.00	0.50	0.0000
SP-9/8	1.00	0.01	0.00	0.00	0.62	0.37	0.00	0.00	0.56	0.0000
SP-8/7	1.00	0.01	0.00	0.00	0.63	0.36	0.00	0.00	0.53	0.0000
SP-7/6	1.00	0.01	0.00	0.00	0.60	0.39	0.00	0.00	0.61	0.0000
SP-6/5	1.00	0.01	0.00	0.00	0.59	0.40	0.00	0.00	0.75	0.0000
SP-5/4	1.00	0.01	0.00	0.00	0.62	0.37	0.00	0.00	0.57	0.0000
SP-4/3	1.00	0.01	0.00	0.00	0.61	0.38	0.00	0.00	0.65	0.0001
SP-3/1	1.00	0.01	0.00	0.00	0.55	0.44	0.00	0.00	0.95	0.0000
H-5/4	1.00	0.98	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.0000
H-4/3	1.00	0.98	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.0000
H-3/2	1.00	0.02	0.96	0.00	0.02	0.00	0.00	0.00	0.00	0.0000
H-2/1	1.00	0.02	0.00	0.00	0.02	0.00	0.00	0.96	0.00	0.0000
A-2/1	1.00	0.89	0.05	0.00	0.06	0.00	0.00	0.00	0.00	0.0000
A-1/SPond	1.00	0.88	0.01	0.00	0.11	0.00	0.00	0.00	0.00	0.0000
FG-6/5	1.00	0.65	0.01	0.00	0.00	0.33	0.00	0.00	0.46	0.0000
FG-5/4	1.00	0.01	0.65	0.00	0.34	0.01	0.00	0.00	0.10	0.0000
FG-4/3	1.00	0.01	0.00	0.00	0.63	0.36	0.00	0.00	0.55	0.0000
FG-3/2	1.00	0.01	0.00	0.00	0.64	0.35	0.00	0.00	0.56	0.0000
FG-2/1	1.00	0.01	0.00	0.00	0.61	0.38	0.00	0.00	0.74	0.0000
FG-1/NPond	1.00	0.01	0.00	0.00	0.03	0.02	0.00	0.94	1.23	0.0000
RTPond-FG-4	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.43	0.0000
SPond/NPond	1.00	0.01	0.00	0.00	0.15	0.00	0.00	0.83	0.25	0.0000
SPond/SP-22	1.00	0.63	0.24	0.00	0.12	0.00	0.00	0.00	0.04	0.0000
NPond/SP-20	1.00	0.01	0.00	0.00	0.36	0.00	0.00	0.63	0.22	0.0007

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
SP-26/25	0.04	0.04	0.04	0.01	0.01
SP-25/24	0.17	0.17	0.17	0.01	0.01
SP-24/23	0.42	0.42	0.42	0.62	0.20
SP-23/22	1.45	1.45	1.45	0.67	0.22
SP-22/21	2.05	2.05	2.05	0.01	0.01
SP-21/20	2.14	2.14	2.14	0.01	1.75
SP-20/19	1.75	1.75	1.75	8.47	1.75
SP-19/18	1.75	1.75	1.75	0.01	0.01
SP-18/17	2.25	2.25	2.25	2.06	2.00
SP-17/16	2.12	2.12	2.12	2.37	2.09
SP-16/15	2.13	2.13	2.13	0.01	0.01
SP-15/14	2.07	2.07	2.07	1.94	2.07
SP-14/13	2.07	2.07	2.07	0.01	1.36
SP-13/12	1.14	1.14	1.14	2.79	1.14
SP-12/11	1.14	1.14	1.14	0.01	0.88
SP-11/10	1.09	1.09	1.09	0.09	1.09
SP-10/9	0.61	0.61	0.61	2.58	0.61
SP-9/8	0.59	0.59	0.59	0.01	0.59
SP-8/7	0.01	0.01	0.01	0.79	0.01
SP-7/6	0.01	0.01	0.01	0.99	0.01
SP-4/3	0.01	0.01	0.01	0.43	0.01
H-4/3	0.04	0.04	0.04	0.01	0.01
H-3/2	0.21	0.21	0.21	0.01	0.01
H-2/1	0.34	0.34	0.34	0.01	0.01
A-2/1	1.79	1.79	1.79	0.01	0.01
A-1/SPond	1.52	1.52	1.52	0.01	0.01
RTPond-FG-4	0.01	0.01	0.01	7.36	0.01
SPond/NPond	1.26	1.26	1.26	0.01	0.01
NPond/SP-20	6.09	6.09	6.09	6.52	6.02

Analysis begun on: Wed Jun 26 14:12:40 2013

Option 1 - 100-Year Storm

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Analysis ended on:  Wed Jun 26 14:12:56 2013
Total elapsed time: 00:00:16
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Option 2 - 100-Year Storm

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

Option 2 - 100-Year Storm
Louisiana and Lomas Storm Drain Improvements, COA Project No. 730491
Lower invert and build vertical walls at racetrack pond.

*****************************************************
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 ........ YES
  Water Quality .......... NO
Flow Routing Method ...... DYNWAVE
Starting Date ............ APR-01-2013 00:00:00
Ending Date .............. APR-04-2013 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Routing Time Step ........ 1.00 sec


*************
Element Count
*************
Number of rain gages ...... 0
Number of subcatchments ... 0
Number of nodes ........... 42
Number of links ........... 42
Number of pollutants ...... 0
Number of land uses ....... 0


************
Node Summary
************
                                 Invert      Max.    Ponded    External
Name                Type          Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------
SP-28               JUNCTION     5280.18      6.13       0.0    Yes
SP-27               JUNCTION     5277.74      9.86       0.0
SP-26               JUNCTION     5276.24     12.43       0.0
SP-25               JUNCTION     5273.95     13.49       0.0
SP-24/H-1           JUNCTION     5272.76      9.41       0.0    Yes
SP-23               JUNCTION     5269.53      6.40       0.0
SP-22               JUNCTION     5266.99      8.04       0.0    Yes
SP-21               JUNCTION     5266.30      9.89       0.0
SP-20               JUNCTION     5265.84     11.58       0.0
SP-19               JUNCTION     5265.79     10.71       0.0
SP-18               JUNCTION     5263.27     10.55       0.0
SP-17               JUNCTION     5261.57      8.74       0.0    Yes
SP-16               JUNCTION     5260.10      7.36       0.0
SP-15               JUNCTION     5257.62      8.56       0.0    Yes
SP-14               JUNCTION     5255.73      9.33       0.0
SP-13               JUNCTION     5253.70      9.83       0.0    Yes
SP-12               JUNCTION     5252.29     10.26       0.0
SP-11               JUNCTION     5249.84     11.39       0.0
SP-10               JUNCTION     5249.22     11.34       0.0    Yes
SP-9                JUNCTION     5247.42     10.53       0.0
SP-8                JUNCTION     5244.68     11.58       0.0
SP-7                JUNCTION     5242.35     12.26       0.0
```

Option 2 - 100-Year Storm

SP-6	JUNCTION	5239.75	11.67	0.0	
SP-5	JUNCTION	5236.42	11.96	0.0	
SP-4	JUNCTION	5232.86	12.14	0.0	Yes
SP-3	JUNCTION	5231.86	19.57	0.0	
H-5	JUNCTION	5277.23	9.25	0.0	
H-4	JUNCTION	5276.05	7.40	0.0	
H-3	JUNCTION	5274.96	7.70	0.0	
H-2	JUNCTION	5273.98	8.02	0.0	
A-2	JUNCTION	5269.55	6.63	0.0	
A-1	JUNCTION	5269.07	6.04	0.0	
FG-6/LA-1	JUNCTION	5299.95	9.65	0.0	Yes
FG-5	JUNCTION	5296.46	9.00	0.0	
FG-4	JUNCTION	5290.82	7.97	0.0	
FG-3	JUNCTION	5289.93	8.43	0.0	
FG-2	JUNCTION	5286.18	7.72	0.0	
FG-1	JUNCTION	5271.79	6.85	0.0	
SP-1	OUTFALL	5222.92	5.00	0.0	
RTPond	STORAGE	5294.58	12.92	0.0	Yes
NPond	STORAGE	5266.29	10.71	0.0	Yes
SPond	STORAGE	5267.50	7.00	0.0	Yes

****
Link Summary
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Name	From Node	To Node	Type	Length	%Slope	Roughness
SP-28/27	SP-28	SP-27	CONDUIT	296.0	0.8244	0.0130
SP-27/26	SP-27	SP-26	CONDUIT	362.0	0.4144	0.0130
SP-26/25	SP-26	SP-25	CONDUIT	497.0	0.4608	0.0130
SP-25/24	SP-25	SP-24/H-1	CONDUIT	321.0	0.3707	0.0130
SP-24/23	SP-24/H-1	SP-23	CONDUIT	468.0	0.6902	0.0130
SP-23/22	SP-23	SP-22	CONDUIT	467.0	0.5439	0.0130
SP-22/21	SP-22	SP-21	CONDUIT	263.0	0.2624	0.0130
SP-21/20	SP-21	SP-20	CONDUIT	255.0	0.1804	0.0130
SP-20/19	SP-20	SP-19	CONDUIT	164.0	0.0305	0.0130
SP-19/18	SP-19	SP-18	CONDUIT	114.0	2.2111	0.0130
SP-18/17	SP-18	SP-17	CONDUIT	338.0	0.5030	0.0130
SP-17/16	SP-17	SP-16	CONDUIT	304.0	0.4836	0.0130
SP-16/15	SP-16	SP-15	CONDUIT	354.0	0.7006	0.0130
SP-15/14	SP-15	SP-14	CONDUIT	350.0	0.5400	0.0130
SP-14/13	SP-14	SP-13	CONDUIT	301.0	0.6744	0.0130
SP-13/12	SP-13	SP-12	CONDUIT	349.0	0.4040	0.0130
SP-12/11	SP-12	SP-11	CONDUIT	313.0	0.7828	0.0130
SP-11/10	SP-11	SP-10	CONDUIT	88.0	0.7046	0.0130
SP-10/9	SP-10	SP-9	CONDUIT	335.0	0.5373	0.0130
SP-9/8	SP-9	SP-8	CONDUIT	291.0	0.9416	0.0130
SP-8/7	SP-8	SP-7	CONDUIT	295.0	0.7899	0.0130
SP-7/6	SP-7	SP-6	CONDUIT	357.0	0.7283	0.0130
SP-6/5	SP-6	SP-5	CONDUIT	235.0	1.4172	0.0130
SP-5/4	SP-5	SP-4	CONDUIT	276.0	1.2900	0.0130
SP-4/3	SP-4	SP-3	CONDUIT	162.0	0.6173	0.0130
SP-3/1	SP-3	SP-1	CONDUIT	430.0	2.0795	0.0130
H-5/4	H-5	H-4	CONDUIT	248.0	0.4758	0.0130
H-4/3	H-4	H-3	CONDUIT	230.0	0.4739	0.0130
H-3/2	H-3	H-2	CONDUIT	203.0	0.4828	0.0130
H-2/1	H-2	SP-24/H-1	CONDUIT	82.0	0.3049	0.0130
A-2/1	A-2	A-1	CONDUIT	36.0	1.0278	0.0130
A-1/SPond	A-1	SPond	CONDUIT	31.9	1.5025	0.0130
FG-6/5	FG-6/LA-1	FG-5	CONDUIT	311.0	1.1223	0.0130
FG-5/4	FG-5	FG-4	CONDUIT	509.0	1.1081	0.0130
FG-4/3	FG-4	FG-3	CONDUIT	177.6	0.5011	0.0130
FG-3/2	FG-3	FG-2	CONDUIT	348.3	1.0768	0.0130
FG-2/1	FG-2	FG-1	CONDUIT	1438.0	1.0007	0.0130
FG-1/NPond	FG-1	NPond	CONDUIT	59.0	5.5339	0.0130
RTPond/FG-4	RTPond	FG-4	CONDUIT	753.0	0.4993	0.0130
SPond/NPond	SPond	NPond	CONDUIT	135.3	0.3843	0.0130
NPond/SP-20	NPond	SP-20	CONDUIT	66.9	0.5085	0.0130
SPond-SP-22	SPond	SP-22	CONDUIT	21.0	7.5932	0.0130

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Option 2 - 100-Year Storm

Cross Section Summary
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Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
SP-28/27	CIRCULAR	5.50	23.76	1.38	5.50	1	304.89
SP-27/26	CIRCULAR	5.50	23.76	1.38	5.50	1	216.17
SP-26/25	CIRCULAR	5.50	23.76	1.38	5.50	1	227.95
SP-25/24	CIRCULAR	5.50	23.76	1.38	5.50	1	204.46
SP-24/23	CIRCULAR	4.00	12.57	1.00	4.00	2	119.34
SP-23/22	CIRCULAR	4.00	12.57	1.00	4.00	2	105.94
SP-22/21	CIRCULAR	5.00	19.63	1.25	5.00	1	133.40
SP-21/20	CIRCULAR	5.00	19.63	1.25	5.00	1	110.62
SP-20/19	CIRCULAR	4.50	15.90	1.13	4.50	1	34.34
SP-19/18	CIRCULAR	4.50	15.90	1.13	4.50	1	292.41
SP-18/17	CIRCULAR	4.50	15.90	1.13	4.50	1	139.46
SP-17/16	CIRCULAR	4.50	15.90	1.13	4.50	1	136.75
SP-16/15	CIRCULAR	4.50	15.90	1.13	4.50	1	164.60
SP-15/14	CIRCULAR	4.50	15.90	1.13	4.50	1	144.51
SP-14/13	CIRCULAR	4.50	15.90	1.13	4.50	1	161.50
SP-13/12	CIRCULAR	4.50	15.90	1.13	4.50	1	124.99
SP-12/11	CIRCULAR	4.50	15.90	1.13	4.50	1	173.98
SP-11/10	CIRCULAR	4.50	15.90	1.13	4.50	1	165.06
SP-10/9	CIRCULAR	4.50	15.90	1.13	4.50	1	144.15
SP-9/8	CIRCULAR	4.50	15.90	1.13	4.50	1	190.82
SP-8/7	CIRCULAR	4.50	15.90	1.13	4.50	1	174.77
SP-7/6	CIRCULAR	4.50	15.90	1.13	4.50	1	167.82
SP-6/5	CIRCULAR	4.50	15.90	1.13	4.50	1	234.10
SP-5/4	CIRCULAR	5.00	19.63	1.25	5.00	1	295.80
SP-4/3	CIRCULAR	5.00	19.63	1.25	5.00	1	204.62
SP-3/1	CIRCULAR	5.00	19.63	1.25	5.00	1	375.57
H-5/4	CIRCULAR	3.50	9.62	0.88	3.50	1	69.40
H-4/3	CIRCULAR	3.50	9.62	0.88	3.50	1	69.26
H-3/2	CIRCULAR	3.50	9.62	0.88	3.50	1	69.90
H-2/1	CIRCULAR	3.50	9.62	0.88	3.50	1	55.55
A-2/1	CIRCULAR	3.00	7.07	0.75	3.00	1	67.62
A-1/SPond	CIRCULAR	4.00	12.57	1.00	4.00	1	176.07
FG-6/5	CIRCULAR	4.00	12.57	1.00	4.00	1	152.17
FG-5/4	CIRCULAR	4.00	12.57	1.00	4.00	1	151.21
FG-4/3	CIRCULAR	4.00	12.57	1.00	4.00	1	101.69
FG-3/2	CIRCULAR	4.00	12.57	1.00	4.00	1	149.06
FG-2/1	CIRCULAR	4.00	12.57	1.00	4.00	1	143.70
FG-1/NPond	CIRCULAR	4.00	12.57	1.00	4.00	1	337.91
RTPond/FG-4	CIRCULAR	3.00	7.07	0.75	3.00	1	47.13
SPond/NPond	CIRCULAR	6.00	28.27	1.50	6.00	2	262.55
NPond/SP-20	CIRCULAR	2.50	4.91	0.63	2.50	1	29.25
SPond-SP-22	RECT_CLOSED	6.00	48.00	1.71	8.00	1	2165.64

****
Control Actions Taken
****

Flow Routing Continuity	Volume acre-feet	Volume 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	87.157	28.401
External Outflow	85.378	27.822
Internal Outflow	1.842	0.600
Storage Losses	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-0.072	

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Option 2 - 100-Year Storm

Time-Step Critical Elements
****
None

****
Highest Flow Instability Indexes
****
Link NPond/SP-20 (7)

****
Routing Time Step Summary
****
Minimum Time Step : 0.50 sec
Average Time Step : 1.00 sec
Maximum Time Step : 1.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.01

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days	hr:min
SP-28	JUNCTION	0.13	3.62	5283.80	0	01:42
SP-27	JUNCTION	0.16	4.91	5282.65	0	01:42
SP-26	JUNCTION	0.16	5.54	5281.78	0	01:42
SP-25	JUNCTION	0.17	6.47	5280.42	0	01:43
SP-24/H-1	JUNCTION	0.16	6.72	5279.48	0	01:43
SP-23	JUNCTION	0.24	6.46	5275.99	0	01:45
SP-22	JUNCTION	0.49	7.51	5274.50	0	02:01
SP-21	JUNCTION	0.55	7.73	5274.03	0	02:02
SP-20	JUNCTION	0.65	7.73	5273.57	0	02:02
SP-19	JUNCTION	0.42	6.45	5272.24	0	02:02
SP-18	JUNCTION	0.58	10.49	5273.76	0	01:33
SP-17	JUNCTION	0.57	8.74	5270.31	0	01:33
SP-16	JUNCTION	0.52	7.36	5267.46	0	01:33
SP-15	JUNCTION	0.57	8.56	5266.18	0	01:32
SP-14	JUNCTION	0.54	9.18	5264.91	0	01:33
SP-13	JUNCTION	0.58	9.56	5263.26	0	01:33
SP-12	JUNCTION	0.49	9.25	5261.54	0	01:33
SP-11	JUNCTION	0.52	7.78	5257.62	0	01:33
SP-10	JUNCTION	0.52	7.71	5256.93	0	01:33
SP-9	JUNCTION	0.44	5.50	5252.92	0	01:35
SP-8	JUNCTION	0.46	5.23	5249.91	0	01:35
SP-7	JUNCTION	0.46	4.18	5246.53	0	01:35
SP-6	JUNCTION	0.38	3.30	5243.05	0	01:36
SP-5	JUNCTION	0.37	3.33	5239.75	0	01:35
SP-4	JUNCTION	0.46	4.62	5237.48	0	01:39
SP-3	JUNCTION	0.33	3.23	5235.09	0	01:35
H-5	JUNCTION	0.01	2.28	5279.51	0	01:43
H-4	JUNCTION	0.01	3.45	5279.50	0	01:44
H-3	JUNCTION	0.03	4.52	5279.48	0	01:42
H-2	JUNCTION	0.04	5.50	5279.48	0	01:43
A-2	JUNCTION	0.14	4.95	5274.50	0	02:01
A-1	JUNCTION	0.18	5.43	5274.50	0	02:01
FG-6/LA-1	JUNCTION	0.07	1.93	5301.88	0	01:30
FG-5	JUNCTION	0.07	1.86	5298.32	0	01:30
FG-4	JUNCTION	0.39	3.25	5294.07	0	01:31
FG-3	JUNCTION	0.32	2.66	5292.59	0	01:31
FG-2	JUNCTION	0.34	2.79	5288.97	0	01:33
FG-1	JUNCTION	0.25	3.18	5274.97	0	02:03
SP-1	OUTFALL	0.32	3.06	5225.98	0	01:36
RTPond	STORAGE	0.86	10.91	5305.49	0	02:42
NPond	STORAGE	0.72	8.26	5274.55	0	02:03
SPond	STORAGE	0.41	7.00	5274.50	0	02:01

Option 2 - 100-Year Storm

****
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
SP-28	JUNCTION	170.00	170.00	0	01:30	4.206	4.206
SP-27	JUNCTION	0.00	170.71	0	01:30	0.000	4.206
SP-26	JUNCTION	0.00	170.29	0	01:31	0.000	4.206
SP-25	JUNCTION	0.00	169.50	0	01:31	0.000	4.206
SP-24/H-1	JUNCTION	80.00	246.33	0	01:32	1.689	5.947
SP-23	JUNCTION	0.00	230.96	0	01:32	0.000	5.896
SP-22	JUNCTION	7.30	234.55	0	01:32	0.095	15.541
SP-21	JUNCTION	0.00	108.04	0	02:52	0.000	13.760
SP-20	JUNCTION	0.00	151.55	0	02:56	0.000	23.738
SP-19	JUNCTION	0.00	151.55	0	02:56	0.000	23.740
SP-18	JUNCTION	0.00	151.56	0	02:56	0.000	23.740
SP-17	JUNCTION	35.00	152.14	0	02:52	0.499	24.240
SP-16	JUNCTION	0.00	152.14	0	02:52	0.000	24.240
SP-15	JUNCTION	20.00	156.09	0	02:46	0.865	24.838
SP-14	JUNCTION	0.00	156.09	0	02:46	0.000	24.839
SP-13	JUNCTION	20.00	167.14	0	01:34	0.811	25.651
SP-12	JUNCTION	0.00	167.14	0	01:34	0.000	25.651
SP-11	JUNCTION	0.00	167.14	0	01:34	0.000	25.652
SP-10	JUNCTION	20.00	187.14	0	01:34	0.897	26.549
SP-9	JUNCTION	0.00	187.14	0	01:34	0.000	26.550
SP-8	JUNCTION	0.00	186.63	0	01:35	0.000	26.550
SP-7	JUNCTION	0.00	186.36	0	01:35	0.000	26.550
SP-6	JUNCTION	0.00	184.42	0	01:36	0.000	26.550
SP-5	JUNCTION	0.00	184.65	0	01:36	0.000	26.550
SP-4	JUNCTION	75.00	258.92	0	01:36	1.269	27.819
SP-3	JUNCTION	0.00	258.83	0	01:36	0.000	27.819
H-5	JUNCTION	0.00	3.67	0	01:38	0.000	0.007
H-4	JUNCTION	0.00	9.58	0	01:37	0.000	0.031
H-3	JUNCTION	0.00	10.85	0	01:36	0.000	0.064
H-2	JUNCTION	0.00	10.89	0	01:36	0.000	0.091
A-2	JUNCTION	0.00	0.44	0	01:35	0.000	0.002
A-1	JUNCTION	0.00	1.20	0	01:35	0.000	0.006
FG-6/LA-1	JUNCTION	67.08	67.08	0	01:30	1.082	1.082
FG-5	JUNCTION	0.00	67.13	0	01:30	0.000	1.082
FG-4	JUNCTION	0.00	108.75	0	01:30	0.000	16.981
FG-3	JUNCTION	0.00	108.52	0	01:32	0.000	16.978
FG-2	JUNCTION	0.00	108.58	0	01:32	0.000	16.979
FG-1	JUNCTION	0.00	108.29	0	01:33	0.000	16.979
SP-1	OUTFALL	0.00	259.21	0	01:36	0.000	27.820
RTPond	STORAGE	764.14	764.14	0	01:42	15.890	15.890
NPond	STORAGE	25.90	208.09	0	01:31	0.148	17.935
SPond	STORAGE	59.18	197.37	0	01:35	0.946	10.698

****
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
SP-26	JUNCTION	0.01	0.038	6.892
SP-25	JUNCTION	0.16	0.965	7.025
SP-24/H-1	JUNCTION	0.22	1.220	2.690
SP-23	JUNCTION	1.47	2.462	0.000
SP-22	JUNCTION	1.55	1.511	0.529
SP-21	JUNCTION	2.15	2.729	2.161

SP-20	JUNCTION	2.15	2.730	3.850
SP-19	JUNCTION	1.76	1.948	4.262
SP-18	JUNCTION	2.33	5.994	0.056
SP-17	JUNCTION	2.25	4.240	0.000
SP-16	JUNCTION	2.13	2.860	0.000
SP-15	JUNCTION	2.32	4.060	0.000
SP-14	JUNCTION	2.08	4.678	0.152
SP-13	JUNCTION	2.35	5.058	0.272
SP-12	JUNCTION	1.13	4.751	1.009
SP-11	JUNCTION	1.30	3.275	3.615
SP-10	JUNCTION	1.09	3.206	3.634
SP-9	JUNCTION	0.61	0.999	5.031
SP-8	JUNCTION	0.58	0.732	6.348
H-3	JUNCTION	0.20	1.019	3.181
H-2	JUNCTION	0.33	1.999	2.521
A-2	JUNCTION	1.79	1.951	1.679
A-1	JUNCTION	1.52	1.431	0.609
RTPond	STORAGE	7.10	7.911	2.009
NPond	STORAGE	1.57	1.568	2.452

****
Node Flooding Summary
****

Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum Rate CFS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 gal	Maximum Ponded Depth Feet
SP-17	0.01	24.58	0 01:33	0.000	8.74
SP-16	0.70	22.84	0 02:02	0.267	7.36
SP-15	0.01	8.26	0 01:32	0.000	8.56
SPond	0.28	97.29	0 02:04	0.333	7.00

****
Storage Volume Summary
****

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
RTPond	97.088	4	0	1553.151	69	0 02:42	83.16
NPond	13.823	4	0	239.420	70	0 02:03	113.84
SPond	7.992	3	0	234.581	100	0 02:01	106.93

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
SP-1	44.62	32.29	259.21	27.820
System	44.62	32.29	259.21	27.820

****
Link Flow Summary
****

	Maximum	Time of Max	Maximum	Max/	Max/

Option 2 - 100-Year Storm

Link	Type	|Flow| CFS	Occurrence days	Occurrence hr:min	|Veloc| ft/sec	Full Flow	Full Depth
SP-28/27	CONDUIT	170.71	0	01:30	10.36	0.56	0.77
SP-27/26	CONDUIT	170.29	0	01:31	9.61	0.79	0.95
SP-26/25	CONDUIT	169.50	0	01:31	9.37	0.74	1.00
SP-25/24	CONDUIT	166.33	0	01:32	9.32	0.81	1.00
SP-24/23	CONDUIT	230.96	0	01:32	9.36	0.97	1.00
SP-23/22	CONDUIT	228.78	0	01:40	9.47	1.08	1.00
SP-22/21	CONDUIT	108.04	0	02:52	5.93	0.81	1.00
SP-21/20	CONDUIT	108.04	0	02:52	5.59	0.98	1.00
SP-20/19	CONDUIT	151.55	0	02:56	10.38	4.41	1.00
SP-19/18	CONDUIT	151.56	0	02:56	10.97	0.52	1.00
SP-18/17	CONDUIT	151.56	0	02:56	9.53	1.09	1.00
SP-17/16	CONDUIT	152.14	0	02:52	9.97	1.11	1.00
SP-16/15	CONDUIT	152.14	0	02:52	9.99	0.92	1.00
SP-15/14	CONDUIT	156.09	0	02:46	9.83	1.08	1.00
SP-14/13	CONDUIT	156.10	0	02:45	9.81	0.97	1.00
SP-13/12	CONDUIT	167.14	0	01:34	10.51	1.34	1.00
SP-12/11	CONDUIT	167.14	0	01:34	10.51	0.96	1.00
SP-11/10	CONDUIT	167.14	0	01:34	10.51	1.01	1.00
SP-10/9	CONDUIT	187.14	0	01:34	11.87	1.30	1.00
SP-9/8	CONDUIT	186.63	0	01:35	11.92	0.98	1.00
SP-8/7	CONDUIT	186.36	0	01:35	11.89	1.07	0.96
SP-7/6	CONDUIT	184.42	0	01:36	13.17	1.10	0.83
SP-6/5	CONDUIT	184.65	0	01:36	15.14	0.79	0.74
SP-5/4	CONDUIT	185.09	0	01:40	12.61	0.63	0.79
SP-4/3	CONDUIT	258.83	0	01:36	16.05	1.26	0.78
SP-3/1	CONDUIT	259.21	0	01:36	20.05	0.69	0.63
H-5/4	CONDUIT	3.67	0	01:38	0.95	0.05	0.82
H-4/3	CONDUIT	9.58	0	01:37	1.18	0.14	0.99
H-3/2	CONDUIT	10.85	0	01:36	1.50	0.16	1.00
H-2/1	CONDUIT	10.89	0	01:36	1.52	0.20	1.00
A-2/1	CONDUIT	0.44	0	01:35	0.59	0.01	1.00
A-1/SPond	CONDUIT	1.20	0	01:35	0.44	0.01	1.00
FG-6/5	CONDUIT	67.13	0	01:30	11.50	0.44	0.47
FG-5/4	CONDUIT	66.52	0	01:30	8.05	0.44	0.64
FG-4/3	CONDUIT	108.52	0	01:32	10.91	1.07	0.74
FG-3/2	CONDUIT	108.58	0	01:32	12.06	0.73	0.68
FG-2/1	CONDUIT	108.29	0	01:33	14.61	0.75	0.69
FG-1/NPond	CONDUIT	108.28	0	01:33	21.45	0.32	0.90
RTPond/FG-4	CONDUIT	83.16	0	02:41	11.89	1.76	1.00
SPond/NPond	CONDUIT	106.10	0	01:31	5.67	0.20	1.00
NPond/SP-20	CONDUIT	43.51	0	02:56	8.86	1.49	1.00
SPond-SP-22	CONDUIT	151.78	0	01:38	7.57	0.07	0.99

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
SP-28/27	1.00	0.65	0.00	0.00	0.02	0.33	0.00	0.00	0.38	0.0000
SP-27/26	1.00	0.65	0.00	0.00	0.21	0.13	0.00	0.00	0.34	0.0000
SP-26/25	1.00	0.65	0.00	0.00	0.32	0.03	0.00	0.00	0.32	0.0000
SP-25/24	1.00	0.65	0.00	0.00	0.04	0.31	0.00	0.00	0.37	0.0000
SP-24/23	1.00	0.64	0.00	0.00	0.07	0.29	0.00	0.00	0.35	0.0000
SP-23/22	1.00	0.63	0.01	0.00	0.35	0.00	0.00	0.00	0.16	0.0000
SP-22/21	1.00	0.62	0.01	0.00	0.37	0.00	0.00	0.00	0.20	0.0000
SP-21/20	1.00	0.01	0.61	0.00	0.38	0.00	0.00	0.00	0.11	0.0000
SP-20/19	1.00	0.01	0.00	0.00	0.70	0.29	0.00	0.00	0.39	0.0000
SP-19/18	1.00	0.01	0.00	0.00	0.63	0.36	0.00	0.00	0.59	0.0000
SP-18/17	1.00	0.01	0.00	0.00	0.69	0.30	0.00	0.00	0.41	0.0000
SP-17/16	1.00	0.01	0.00	0.00	0.67	0.32	0.00	0.00	0.46	0.0000
SP-16/15	1.00	0.01	0.00	0.00	0.67	0.32	0.00	0.00	0.46	0.0000
SP-15/14	1.00	0.01	0.00	0.00	0.66	0.33	0.00	0.00	0.47	0.0000
SP-14/13	1.00	0.01	0.00	0.00	0.69	0.30	0.00	0.00	0.42	0.0000
SP-13/12	1.00	0.01	0.00	0.00	0.67	0.32	0.00	0.00	0.46	0.0000

Option 2 - 100-Year Storm

SP-12/11	1.00	0.01	0.00	0.00	0.64	0.35	0.00	0.00	0.52	0.0000
SP-11/10	1.00	0.01	0.00	0.00	0.67	0.32	0.00	0.00	0.46	0.0000
SP-10/9	1.00	0.01	0.00	0.00	0.63	0.36	0.00	0.00	0.52	0.0000
SP-9/8	1.00	0.01	0.00	0.00	0.61	0.38	0.00	0.00	0.59	0.0000
SP-8/7	1.00	0.01	0.00	0.00	0.62	0.37	0.00	0.00	0.55	0.0000
SP-7/6	1.00	0.01	0.00	0.00	0.59	0.40	0.00	0.00	0.63	0.0000
SP-6/5	1.00	0.01	0.00	0.00	0.57	0.42	0.00	0.00	0.78	0.0000
SP-5/4	1.00	0.01	0.00	0.00	0.60	0.39	0.00	0.00	0.59	0.0000
SP-4/3	1.00	0.01	0.00	0.00	0.59	0.40	0.00	0.00	0.67	0.0001
SP-3/1	1.00	0.01	0.00	0.00	0.53	0.46	0.00	0.00	1.00	0.0000
H-5/4	1.00	0.98	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.0000
H-4/3	1.00	0.98	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.0000
H-3/2	1.00	0.02	0.96	0.00	0.02	0.00	0.00	0.00	0.00	0.0000
H-2/1	1.00	0.02	0.00	0.00	0.02	0.00	0.00	0.96	0.00	0.0000
A-2/1	1.00	0.89	0.06	0.00	0.05	0.00	0.00	0.00	0.00	0.0000
A-1/SPond	1.00	0.87	0.01	0.00	0.12	0.00	0.00	0.00	0.00	0.0000
FG-6/5	1.00	0.65	0.01	0.00	0.00	0.33	0.00	0.00	0.47	0.0000
FG-5/4	1.00	0.01	0.64	0.00	0.34	0.01	0.00	0.00	0.09	0.0000
FG-4/3	1.00	0.01	0.00	0.00	0.63	0.36	0.00	0.00	0.51	0.0001
FG-3/2	1.00	0.01	0.00	0.00	0.62	0.37	0.00	0.00	0.58	0.0000
FG-2/1	1.00	0.01	0.00	0.00	0.59	0.40	0.00	0.00	0.78	0.0000
FG-1/NPond	1.00	0.01	0.00	0.00	0.03	0.02	0.00	0.95	1.29	0.0000
RTPond/FG-4	1.00	0.01	0.00	0.00	0.76	0.23	0.00	0.00	0.40	0.0000
SPond/NPond	1.00	0.01	0.00	0.00	0.17	0.00	0.00	0.82	0.23	0.0000
NPond/SP-20	1.00	0.01	0.00	0.00	0.36	0.00	0.00	0.63	0.24	0.0007
SPond-SP-22	1.00	0.63	0.24	0.00	0.13	0.00	0.00	0.00	0.04	0.0000

****
Conduit Surcharge Summary
****

	Hours Full			Hours Above Full	Hours Capacity
Conduit	Both Ends	Upstream	Dnstream	Normal Flow	Limited
SP-26/25	0.01	0.01	0.01	0.01	0.01
SP-25/24	0.16	0.16	0.16	0.01	0.01
SP-24/23	0.41	0.41	0.41	0.61	0.20
SP-23/22	1.46	1.46	1.46	0.67	0.21
SP-22/21	2.05	2.05	2.05	0.01	0.01
SP-21/20	2.14	2.14	2.14	0.01	1.73
SP-20/19	1.76	1.76	1.76	8.81	1.76
SP-19/18	1.76	1.76	1.76	0.01	0.01
SP-18/17	2.25	2.25	2.25	2.03	1.99
SP-17/16	2.13	2.13	2.13	2.34	2.09
SP-16/15	2.13	2.13	2.13	0.01	0.01
SP-15/14	2.08	2.08	2.08	1.93	2.07
SP-14/13	2.08	2.08	2.08	0.01	1.37
SP-13/12	1.13	1.13	1.13	2.77	1.13
SP-12/11	1.13	1.13	1.13	0.01	0.88
SP-11/10	1.09	1.09	1.09	0.09	1.09
SP-10/9	0.61	0.61	0.61	2.57	0.61
SP-9/8	0.58	0.58	0.58	0.01	0.58
SP-8/7	0.01	0.01	0.01	0.78	0.01
SP-7/6	0.01	0.01	0.01	0.98	0.01
SP-4/3	0.01	0.01	0.01	0.42	0.01
H-3/2	0.20	0.20	0.20	0.01	0.01
H-2/1	0.33	0.33	0.33	0.01	0.01
A-2/1	1.79	1.79	1.79	0.01	0.01
A-1/SPond	1.52	1.52	1.52	0.01	0.01
FG-4/3	0.01	0.01	0.01	0.09	0.01
RTPond/FG-4	0.06	0.06	0.06	7.54	0.05
SPond/NPond	1.25	1.25	1.25	0.01	0.01
NPond/SP-20	5.46	5.46	5.46	5.84	5.39

Analysis begun on: Wed Jun 26 14:13:54 2013
Analysis ended on: Wed Jun 26 14:14:10 2013
Total elapsed time: 00:00:16

Option 3 - 100-Year Storm

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

Option 3 - 100-Year Storm
Louisiana and Lomas Storm Drain Improvements, COA Project No. 730491
Lower invert and build vertical walls at racetrack pond; build new storm drain in Louisiana and Lomas Blvds.

***********************************************************
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 ........ YES
  Water Quality .......... NO
Flow Routing Method ...... DYNWAVE
Starting Date ............ APR-01-2013 00:00:00
Ending Date .............. APR-05-2013 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:00:15
Routing Time Step ........ 1.00 sec


*************
Element Count
*************
Number of rain gages ...... 0
Number of subcatchments ... 0
Number of nodes ........... 44
Number of links ........... 44
Number of pollutants ...... 0
Number of land uses ....... 0


************
Node Summary
************
                                 Invert      Max.    Ponded    External
Name                Type          Elev.     Depth      Area    Inflow
--------------------------------------------------------------------------
SP-28               JUNCTION     5280.18      6.13       0.0    Yes
SP-27               JUNCTION     5277.74      9.86       0.0
SP-26               JUNCTION     5276.24     12.43       0.0
SP-25               JUNCTION     5273.95     13.49       0.0
SP-24/H-1           JUNCTION     5272.76      9.41       0.0    Yes
SP-23               JUNCTION     5269.53      6.40       0.0
SP-22               JUNCTION     5266.99      8.04       0.0    Yes
SP-21               JUNCTION     5266.30      9.89       0.0
SP-20               JUNCTION     5265.84     11.58       0.0
SP-19               JUNCTION     5265.79     10.71       0.0
SP-18               JUNCTION     5263.27     10.55       0.0
SP-17               JUNCTION     5261.57      8.74       0.0    Yes
SP-16               JUNCTION     5260.10      7.36       0.0
SP-15               JUNCTION     5257.62      8.56       0.0    Yes
SP-14               JUNCTION     5255.73      9.33       0.0
SP-13               JUNCTION     5253.70      9.83       0.0    Yes
SP-12               JUNCTION     5252.29     10.26       0.0
SP-11               JUNCTION     5249.84     11.39       0.0
SP-10               JUNCTION     5249.22     11.34       0.0    Yes
SP-9                JUNCTION     5247.42     10.53       0.0
SP-8                JUNCTION     5244.68     11.58       0.0
SP-7                JUNCTION     5242.35     12.26       0.0
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SP-6	JUNCTION	5239.75	11.67	0.0	
SP-5	JUNCTION	5236.42	11.96	0.0	
SP-4	JUNCTION	5232.86	12.14	0.0	Yes
SP-3	JUNCTION	5231.86	19.57	0.0	
H-5	JUNCTION	5277.23	9.25	0.0	
H-4	JUNCTION	5276.05	7.40	0.0	
H-3	JUNCTION	5274.96	7.70	0.0	
H-2	JUNCTION	5273.98	8.02	0.0	
A-2	JUNCTION	5269.55	6.63	0.0	
A-1	JUNCTION	5269.07	6.04	0.0	
FG-6/LA-2	JUNCTION	5292.96	9.65	0.0	Yes
FG-5	JUNCTION	5296.46	9.00	0.0	
FG-4	JUNCTION	5291.41	7.38	0.0	
FG-3	JUNCTION	5290.06	8.30	0.0	
FG-2	JUNCTION	5286.18	7.72	0.0	
FG-1	JUNCTION	5271.79	6.85	0.0	
LA-3	JUNCTION	5286.54	27.46	0.0	
LA-1	JUNCTION	5294.36	14.94	0.0	
SP-1	OUTFALL	5222.92	5.00	0.0	
RTPond	STORAGE	5294.58	12.92	0.0	Yes
NPond	STORAGE	5266.29	10.71	0.0	Yes
SPond	STORAGE	5267.50	7.00	0.0	Yes

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
SP-28/27	SP-28	SP-27	CONDUIT	296.0	0.8244	0.0130
SP-27/26	SP-27	SP-26	CONDUIT	362.0	0.4144	0.0130
SP-26/25	SP-26	SP-25	CONDUIT	497.0	0.4608	0.0130
SP-25/24	SP-25	SP-24/H-1	CONDUIT	321.0	0.3707	0.0130
SP-24/23	SP-24/H-1	SP-23	CONDUIT	468.0	0.6902	0.0130
SP-23/22	SP-23	SP-22	CONDUIT	467.0	0.5439	0.0130
SP-22/21	SP-22	SP-21	CONDUIT	263.0	0.2624	0.0130
SP-21/20	SP-21	SP-20	CONDUIT	255.0	0.1804	0.0130
SP-20/19	SP-20	SP-19	CONDUIT	164.0	0.0305	0.0130
SP-19/18	SP-19	SP-18	CONDUIT	114.0	2.2111	0.0130
SP-18/17	SP-18	SP-17	CONDUIT	338.0	0.5030	0.0130
SP-17/16	SP-17	SP-16	CONDUIT	304.0	0.4836	0.0130
SP-16/15	SP-16	SP-15	CONDUIT	354.0	0.7006	0.0130
SP-15/14	SP-15	SP-14	CONDUIT	350.0	0.5400	0.0130
SP-14/13	SP-14	SP-13	CONDUIT	301.0	0.6744	0.0130
SP-13/12	SP-13	SP-12	CONDUIT	349.0	0.4040	0.0130
SP-12/11	SP-12	SP-11	CONDUIT	313.0	0.7828	0.0130
SP-11/10	SP-11	SP-10	CONDUIT	88.0	0.7046	0.0130
SP-10/9	SP-10	SP-9	CONDUIT	335.0	0.5373	0.0130
SP-9/8	SP-9	SP-8	CONDUIT	291.0	0.9416	0.0130
SP-8/7	SP-8	SP-7	CONDUIT	295.0	0.7899	0.0130
SP-7/6	SP-7	SP-6	CONDUIT	357.0	0.7283	0.0130
SP-6/5	SP-6	SP-5	CONDUIT	235.0	1.4172	0.0130
SP-5/4	SP-5	SP-4	CONDUIT	276.0	1.2900	0.0130
SP-4/3	SP-4	SP-3	CONDUIT	162.0	0.6173	0.0130
SP-3/1	SP-3	SP-1	CONDUIT	430.0	2.0795	0.0130
H-5/4	H-5	H-4	CONDUIT	248.0	0.4758	0.0130
H-4/3	H-4	H-3	CONDUIT	230.0	0.4739	0.0130
H-3/2	H-3	H-2	CONDUIT	203.0	0.4828	0.0130
H-2/1	H-2	SP-24/H-1	CONDUIT	82.0	0.3049	0.0130
A-2/1	A-2	A-1	CONDUIT	36.0	1.0278	0.0130
A-1/SPond	A-1	SPond	CONDUIT	31.9	1.5025	0.0130
FG-5/4	FG-5	FG-4	CONDUIT	509.0	0.9922	0.0130
FG-4/3	FG-4	FG-3	CONDUIT	177.6	0.7602	0.0130
FG-3/2	FG-3	FG-2	CONDUIT	348.3	1.1141	0.0130
FG-2/1	FG-2	FG-1	CONDUIT	1438.0	1.0007	0.0130
FG-1/NPond	FG-1	NPond	CONDUIT	59.0	5.5339	0.0130
SPond/NPond	SPond	NPond	CONDUIT	135.3	0.3843	0.0130
SPond/SP-22	SPond	SP-22	CONDUIT	21.0	7.5932	0.0130
NPond/SP-20	NPond	SP-20	CONDUIT	66.9	0.5085	0.0130
RTPond/LA-1	RTPond	LA-1	CONDUIT	225.0	0.0978	0.0130
LA-1/2	LA-1	FG-6/LA-2	CONDUIT	280.0	0.5000	0.0130
LA-2/3	FG-6/LA-2	LA-3	CONDUIT	1284.0	0.5000	0.0130

Option 3 - 100-Year Storm

LA-3/SP-19 LA-3 SP-19 CONDUIT 2606.0 0.7963 0.0130

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
SP-28/27	CIRCULAR	5.50	23.76	1.38	5.50	1	304.89
SP-27/26	CIRCULAR	5.50	23.76	1.38	5.50	1	216.17
SP-26/25	CIRCULAR	5.50	23.76	1.38	5.50	1	227.95
SP-25/24	CIRCULAR	5.50	23.76	1.38	5.50	1	204.46
SP-24/23	CIRCULAR	4.00	12.57	1.00	4.00	2	119.34
SP-23/22	CIRCULAR	4.00	12.57	1.00	4.00	2	105.94
SP-22/21	CIRCULAR	5.00	19.63	1.25	5.00	1	133.40
SP-21/20	CIRCULAR	5.00	19.63	1.25	5.00	1	110.62
SP-20/19	CIRCULAR	4.50	15.90	1.13	4.50	1	34.34
SP-19/18	CIRCULAR	4.50	15.90	1.13	4.50	1	292.41
SP-18/17	CIRCULAR	4.50	15.90	1.13	4.50	1	139.46
SP-17/16	CIRCULAR	4.50	15.90	1.13	4.50	1	136.75
SP-16/15	CIRCULAR	4.50	15.90	1.13	4.50	1	164.60
SP-15/14	CIRCULAR	4.50	15.90	1.13	4.50	1	144.51
SP-14/13	CIRCULAR	4.50	15.90	1.13	4.50	1	161.50
SP-13/12	CIRCULAR	4.50	15.90	1.13	4.50	1	124.99
SP-12/11	CIRCULAR	4.50	15.90	1.13	4.50	1	173.98
SP-11/10	CIRCULAR	4.50	15.90	1.13	4.50	1	165.06
SP-10/9	CIRCULAR	4.50	15.90	1.13	4.50	1	144.15
SP-9/8	CIRCULAR	4.50	15.90	1.13	4.50	1	190.82
SP-8/7	CIRCULAR	4.50	15.90	1.13	4.50	1	174.77
SP-7/6	CIRCULAR	4.50	15.90	1.13	4.50	1	167.82
SP-6/5	CIRCULAR	4.50	15.90	1.13	4.50	1	234.10
SP-5/4	CIRCULAR	5.00	19.63	1.25	5.00	1	295.80
SP-4/3	CIRCULAR	5.00	19.63	1.25	5.00	1	204.62
SP-3/1	CIRCULAR	5.00	19.63	1.25	5.00	1	375.57
H-5/4	CIRCULAR	3.50	9.62	0.88	3.50	1	69.40
H-4/3	CIRCULAR	3.50	9.62	0.88	3.50	1	69.26
H-3/2	CIRCULAR	3.50	9.62	0.88	3.50	1	69.90
H-2/1	CIRCULAR	3.50	9.62	0.88	3.50	1	55.55
A-2/1	CIRCULAR	3.00	7.07	0.75	3.00	1	67.62
A-1/SPond	CIRCULAR	4.00	12.57	1.00	4.00	1	176.07
FG-5/4	CIRCULAR	4.00	12.57	1.00	4.00	1	143.08
FG-4/3	CIRCULAR	4.00	12.57	1.00	4.00	1	125.24
FG-3/2	CIRCULAR	4.00	12.57	1.00	4.00	1	151.62
FG-2/1	CIRCULAR	4.00	12.57	1.00	4.00	1	143.70
FG-1/NPond	CIRCULAR	4.00	12.57	1.00	4.00	1	337.91
SPond/NPond	CIRCULAR	6.00	28.27	1.50	6.00	2	262.55
SPond/SP-22	RECT_CLOSED	6.00	48.00	1.71	8.00	1	2165.64
NPond/SP-20	CIRCULAR	2.50	4.91	0.63	2.50	1	29.25
RTPond/LA-1	CIRCULAR	3.50	9.62	0.88	3.50	1	31.46
LA-1/2	CIRCULAR	4.00	12.57	1.00	4.00	1	101.57
LA-2/3	CIRCULAR	4.00	12.57	1.00	4.00	1	101.57
LA-3/SP-19	CIRCULAR	4.00	12.57	1.00	4.00	1	128.18

****
Control Actions Taken
****

********** Flow Routing Continuity **********	Volume acre-feet	Volume 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	87.157	28.401
External Outflow	84.021	27.380
Internal Outflow	3.186	1.038
Storage Losses	0.000	0.000

Option 3 - 100-Year Storm

```
Initial Stored Volume ....          0.000          0.000
Final Stored Volume ......          0.000          0.000
Continuity Error (%) .....         -0.057


**************************
Time-Step Critical Elements
**************************
None


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


************************
Routing Time Step Summary
************************
Minimum Time Step           :     0.50 sec
Average Time Step           :     1.00 sec
Maximum Time Step           :     1.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.01


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

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days	hr:min
SP-28	JUNCTION	0.10	3.49	5283.67	0	01:42
SP-27	JUNCTION	0.12	4.57	5282.31	0	01:42
SP-26	JUNCTION	0.12	5.11	5281.35	0	01:43
SP-25	JUNCTION	0.13	6.21	5280.16	0	01:42
SP-24/H-1	JUNCTION	0.12	6.49	5279.25	0	01:40
SP-23	JUNCTION	0.21	6.13	5275.66	0	01:45
SP-22	JUNCTION	0.34	7.53	5274.52	0	02:13
SP-21	JUNCTION	0.38	8.24	5274.54	0	02:13
SP-20	JUNCTION	0.44	8.71	5274.55	0	02:13
SP-19	JUNCTION	0.40	10.71	5276.50	0	01:33
SP-18	JUNCTION	0.52	10.55	5273.82	0	01:31
SP-17	JUNCTION	0.49	8.74	5270.31	0	01:31
SP-16	JUNCTION	0.44	7.36	5267.46	0	01:31
SP-15	JUNCTION	0.46	8.56	5266.18	0	01:31
SP-14	JUNCTION	0.43	9.33	5265.06	0	01:31
SP-13	JUNCTION	0.45	9.83	5263.53	0	01:31
SP-12	JUNCTION	0.37	10.26	5262.55	0	01:31
SP-11	JUNCTION	0.39	11.39	5261.23	0	01:31
SP-10	JUNCTION	0.39	9.81	5259.03	0	01:31
SP-9	JUNCTION	0.32	5.58	5253.00	0	01:33
SP-8	JUNCTION	0.34	5.25	5249.93	0	01:34
SP-7	JUNCTION	0.34	4.17	5246.52	0	01:34
SP-6	JUNCTION	0.28	3.30	5243.05	0	01:35
SP-5	JUNCTION	0.27	3.34	5239.76	0	01:34
SP-4	JUNCTION	0.33	4.65	5237.51	0	01:38
SP-3	JUNCTION	0.24	3.23	5235.09	0	01:34
H-5	JUNCTION	0.00	1.97	5279.20	0	01:43
H-4	JUNCTION	0.01	3.17	5279.22	0	01:43
H-3	JUNCTION	0.02	4.23	5279.19	0	01:40
H-2	JUNCTION	0.03	5.25	5279.23	0	01:40
A-2	JUNCTION	0.13	4.95	5274.50	0	02:12
A-1	JUNCTION	0.15	5.43	5274.50	0	02:12
FG-6/LA-2	JUNCTION	0.36	9.37	5302.33	0	02:13
FG-5	JUNCTION	0.00	0.00	5296.46	0	00:00
FG-4	JUNCTION	0.00	0.00	5291.41	0	00:00
FG-3	JUNCTION	0.00	0.00	5290.06	0	00:00

FG-2	JUNCTION	0.00	0.00	5286.18	0	00:00
FG-1	JUNCTION	0.05	2.72	5274.51	0	02:13
LA-3	JUNCTION	0.28	12.66	5299.20	0	02:13
LA-1	JUNCTION	0.35	8.35	5302.71	0	02:13
SP-1	OUTFALL	0.23	3.06	5225.98	0	01:35
RTPond	STORAGE	0.53	10.39	5304.97	0	02:33
NPond	STORAGE	0.35	8.22	5274.51	0	02:14
SPond	STORAGE	0.25	7.00	5274.50	0	02:12

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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
SP-28	JUNCTION	170.00	170.00	0 01:30	4.206	4.206
SP-27	JUNCTION	0.00	170.71	0 01:30	0.000	4.206
SP-26	JUNCTION	0.00	170.29	0 01:31	0.000	4.206
SP-25	JUNCTION	0.00	169.53	0 01:31	0.000	4.206
SP-24/H-1	JUNCTION	80.00	246.56	0 01:32	1.689	5.945
SP-23	JUNCTION	0.00	233.19	0 01:32	0.000	5.895
SP-22	JUNCTION	7.30	237.66	0 01:33	0.095	8.014
SP-21	JUNCTION	0.00	88.46	0 01:32	0.000	5.204
SP-20	JUNCTION	0.00	85.03	0 01:32	0.000	7.239
SP-19	JUNCTION	0.00	169.40	0 02:13	0.000	24.031
SP-18	JUNCTION	0.00	169.23	0 02:13	0.000	24.034
SP-17	JUNCTION	35.00	171.91	0 02:09	0.499	24.533
SP-16	JUNCTION	0.00	171.91	0 02:09	0.000	24.533
SP-15	JUNCTION	20.00	161.72	0 03:19	0.865	24.397
SP-14	JUNCTION	0.00	161.72	0 03:19	0.000	24.397
SP-13	JUNCTION	20.00	167.86	0 01:31	0.811	25.209
SP-12	JUNCTION	0.00	167.74	0 01:31	0.000	25.209
SP-11	JUNCTION	0.00	166.76	0 01:33	0.000	25.210
SP-10	JUNCTION	20.00	186.73	0 01:33	0.897	26.107
SP-9	JUNCTION	0.00	186.70	0 01:33	0.000	26.108
SP-8	JUNCTION	0.00	186.53	0 01:34	0.000	26.108
SP-7	JUNCTION	0.00	186.57	0 01:34	0.000	26.108
SP-6	JUNCTION	0.00	184.46	0 01:35	0.000	26.108
SP-5	JUNCTION	0.00	184.44	0 01:35	0.000	26.108
SP-4	JUNCTION	75.00	259.53	0 01:35	1.269	27.377
SP-3	JUNCTION	0.00	259.72	0 01:34	0.000	27.377
H-5	JUNCTION	0.00	3.26	0 01:37	0.000	0.006
H-4	JUNCTION	0.00	8.20	0 01:38	0.000	0.028
H-3	JUNCTION	0.00	10.27	0 01:36	0.000	0.060
H-2	JUNCTION	0.00	10.35	0 01:36	0.000	0.087
A-2	JUNCTION	0.00	0.38	0 01:36	0.000	0.001
A-1	JUNCTION	0.00	1.02	0 01:36	0.000	0.006
FG-6/LA-2	JUNCTION	67.08	123.54	0 02:07	1.082	16.973
FG-5	JUNCTION	0.00	0.00	0 00:00	0.000	0.000
FG-4	JUNCTION	0.00	0.00	0 00:00	0.000	0.000
FG-3	JUNCTION	0.00	0.00	0 00:00	0.000	0.000
FG-2	JUNCTION	0.00	0.00	0 00:00	0.000	0.000
FG-1	JUNCTION	0.00	5.96	0 01:44	0.000	0.047
LA-3	JUNCTION	0.00	123.54	0 02:07	0.000	16.974
LA-1	JUNCTION	0.00	117.58	0 03:18	0.000	15.891
SP-1	OUTFALL	0.00	260.01	0 01:35	0.000	27.378
RTPond	STORAGE	764.16	764.16	0 01:42	15.890	15.890
NPond	STORAGE	25.90	186.11	0 01:34	0.148	2.387
SPond	STORAGE	59.19	241.73	0 01:35	0.946	4.082

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

Option 3 - 100-Year Storm

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
SP-25	JUNCTION	0.13	0.706	7.284
SP-24/H-1	JUNCTION	0.18	0.986	2.924
SP-23	JUNCTION	1.76	2.125	0.275
SP-22	JUNCTION	1.99	1.532	0.508
SP-21	JUNCTION	3.03	3.242	1.648
SP-20	JUNCTION	3.25	3.709	2.871
SP-19	JUNCTION	3.42	6.210	0.000
SP-18	JUNCTION	3.89	6.050	0.000
SP-17	JUNCTION	3.81	4.240	0.000
SP-16	JUNCTION	3.68	2.860	0.000
SP-15	JUNCTION	3.86	4.060	0.000
SP-14	JUNCTION	3.61	4.830	0.000
SP-13	JUNCTION	3.86	5.330	0.000
SP-12	JUNCTION	2.10	5.760	0.000
SP-11	JUNCTION	2.35	6.890	0.000
SP-10	JUNCTION	1.71	5.306	1.534
SP-9	JUNCTION	0.63	1.082	4.948
SP-8	JUNCTION	0.61	0.747	6.333
H-3	JUNCTION	0.16	0.728	3.472
H-2	JUNCTION	0.29	1.752	2.768
A-2	JUNCTION	2.30	1.950	1.680
A-1	JUNCTION	1.91	1.430	0.610
FG-6/LA-2	JUNCTION	2.67	5.371	0.279
LA-3	JUNCTION	0.95	8.656	14.804
LA-1	JUNCTION	2.65	4.348	6.592
RTPond	STORAGE	4.42	6.891	2.529
NPond	STORAGE	1.98	1.531	2.489

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Node Flooding Summary
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Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum Rate CFS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 gal	Maximum Ponded Depth Feet
SP-19	0.01	22.68	0 01:33	0.000	10.71
SP-18	0.01	23.92	0 01:31	0.000	10.55
SP-17	0.01	16.29	0 01:31	0.000	8.74
SP-16	1.77	47.08	0 02:06	1.002	7.36
SP-15	0.01	8.16	0 01:31	0.000	8.56
SP-14	0.01	5.61	0 01:31	0.000	9.33
SP-13	0.01	2.12	0 01:31	0.000	9.83
SP-12	0.01	13.51	0 01:31	0.000	10.26
SP-11	0.01	8.39	0 01:31	0.000	11.39
SPond	0.08	22.25	0 02:14	0.035	7.00

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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
RTPond	50.831	2	0	1458.439	65	0 02:33	117.58
NPond	7.629	2	0	237.982	70	0 02:14	24.93
SPond	5.772	2	0	234.581	100	0 02:12	146.89

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Outfall Loading Summary

Option 3 - 100-Year Storm

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Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
SP-1	45.09	23.78	260.01	27.378
System	45.09	23.78	260.01	27.378

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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
SP-28/27	CONDUIT	170.71	0	01:30	10.36	0.56	0.73
SP-27/26	CONDUIT	170.29	0	01:31	9.61	0.79	0.88
SP-26/25	CONDUIT	169.53	0	01:31	9.37	0.74	0.96
SP-25/24	CONDUIT	166.56	0	01:32	9.32	0.81	1.00
SP-24/23	CONDUIT	233.19	0	01:32	9.37	0.98	1.00
SP-23/22	CONDUIT	230.45	0	01:33	9.63	1.09	1.00
SP-22/21	CONDUIT	88.46	0	01:32	6.37	0.66	1.00
SP-21/20	CONDUIT	85.03	0	01:32	6.35	0.77	1.00
SP-20/19	CONDUIT	72.05	0	01:31	6.24	2.10	1.00
SP-19/18	CONDUIT	169.23	0	02:13	10.97	0.58	1.00
SP-18/17	CONDUIT	169.29	0	02:13	10.64	1.21	1.00
SP-17/16	CONDUIT	171.91	0	02:09	10.81	1.26	1.00
SP-16/15	CONDUIT	160.06	0	03:48	10.06	0.97	1.00
SP-15/14	CONDUIT	161.72	0	03:19	10.17	1.12	1.00
SP-14/13	CONDUIT	161.72	0	03:19	10.17	1.00	1.00
SP-13/12	CONDUIT	167.74	0	01:31	10.55	1.34	1.00
SP-12/11	CONDUIT	166.76	0	01:33	10.49	0.96	1.00
SP-11/10	CONDUIT	166.73	0	01:33	10.48	1.01	1.00
SP-10/9	CONDUIT	186.70	0	01:33	12.18	1.30	1.00
SP-9/8	CONDUIT	186.53	0	01:34	11.96	0.98	1.00
SP-8/7	CONDUIT	186.57	0	01:34	11.91	1.07	0.96
SP-7/6	CONDUIT	184.46	0	01:35	13.17	1.10	0.83
SP-6/5	CONDUIT	184.44	0	01:35	15.14	0.79	0.74
SP-5/4	CONDUIT	185.21	0	01:39	12.66	0.63	0.80
SP-4/3	CONDUIT	259.72	0	01:34	16.08	1.27	0.78
SP-3/1	CONDUIT	260.01	0	01:35	20.07	0.69	0.63
H-5/4	CONDUIT	3.26	0	01:37	0.92	0.05	0.73
H-4/3	CONDUIT	8.20	0	01:38	1.18	0.12	0.95
H-3/2	CONDUIT	10.27	0	01:36	1.50	0.15	1.00
H-2/1	CONDUIT	10.35	0	01:36	1.52	0.19	1.00
A-2/1	CONDUIT	0.38	0	01:36	0.52	0.01	1.00
A-1/SPond	CONDUIT	1.02	0	01:36	0.42	0.01	1.00
FG-5/4	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
FG-4/3	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
FG-3/2	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
FG-2/1	CONDUIT	0.00	0	00:00	0.00	0.00	0.34
FG-1/NPond	CONDUIT	5.96	0	01:44	0.93	0.02	0.84
SPond/NPond	CONDUIT	146.63	0	01:32	7.35	0.28	1.00
SPond/SP-22	CONDUIT	196.03	0	01:39	8.39	0.09	0.99
NPond/SP-20	CONDUIT	40.43	0	01:34	8.24	1.38	1.00
RTPond/LA-1	CONDUIT	117.58	0	03:18	12.22	3.74	1.00
LA-1/2	CONDUIT	117.58	0	03:18	9.36	1.16	1.00
LA-2/3	CONDUIT	123.54	0	02:07	10.23	1.22	1.00
LA-3/SP-19	CONDUIT	122.90	0	03:18	10.84	0.96	1.00

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Flow Classification Summary
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Option 3 - 100-Year Storm

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
SP-28/27	1.00	0.74	0.00	0.00	0.01	0.24	0.00	0.00	0.29	0.0000
SP-27/26	1.00	0.74	0.00	0.00	0.16	0.10	0.00	0.00	0.25	0.0000
SP-26/25	1.00	0.74	0.00	0.00	0.24	0.02	0.00	0.00	0.24	0.0000
SP-25/24	1.00	0.74	0.00	0.00	0.04	0.23	0.00	0.00	0.28	0.0000
SP-24/23	1.00	0.73	0.00	0.00	0.06	0.21	0.00	0.00	0.26	0.0000
SP-23/22	1.00	0.01	0.73	0.00	0.27	0.00	0.00	0.00	0.14	0.0000
SP-22/21	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.16	0.0000
SP-21/20	1.00	0.69	0.04	0.00	0.28	0.00	0.00	0.00	0.10	0.0000
SP-20/19	1.00	0.01	0.68	0.00	0.31	0.00	0.00	0.00	0.13	0.0000
SP-19/18	1.00	0.01	0.00	0.00	0.71	0.29	0.00	0.00	0.55	0.0000
SP-18/17	1.00	0.01	0.00	0.00	0.78	0.21	0.00	0.00	0.38	0.0000
SP-17/16	1.00	0.01	0.00	0.00	0.76	0.23	0.00	0.00	0.42	0.0000
SP-16/15	1.00	0.01	0.00	0.00	0.76	0.24	0.00	0.00	0.43	0.0000
SP-15/14	1.00	0.01	0.00	0.00	0.75	0.24	0.00	0.00	0.43	0.0000
SP-14/13	1.00	0.01	0.00	0.00	0.78	0.21	0.00	0.00	0.39	0.0000
SP-13/12	1.00	0.01	0.00	0.00	0.77	0.23	0.00	0.00	0.42	0.0000
SP-12/11	1.00	0.01	0.00	0.00	0.72	0.27	0.00	0.00	0.49	0.0000
SP-11/10	1.00	0.01	0.00	0.00	0.76	0.23	0.00	0.00	0.43	0.0000
SP-10/9	1.00	0.01	0.00	0.00	0.72	0.27	0.00	0.00	0.49	0.0000
SP-9/8	1.00	0.01	0.00	0.00	0.68	0.31	0.00	0.00	0.56	0.0000
SP-8/7	1.00	0.01	0.00	0.00	0.70	0.29	0.00	0.00	0.52	0.0000
SP-7/6	1.00	0.01	0.00	0.00	0.66	0.33	0.00	0.00	0.59	0.0000
SP-6/5	1.00	0.01	0.00	0.00	0.62	0.37	0.00	0.00	0.74	0.0000
SP-5/4	1.00	0.01	0.00	0.00	0.68	0.31	0.00	0.00	0.55	0.0000
SP-4/3	1.00	0.01	0.49	0.00	0.18	0.32	0.00	0.00	0.61	0.0001
SP-3/1	1.00	0.01	0.00	0.00	0.49	0.50	0.00	0.00	0.98	0.0000
H-5/4	1.00	0.99	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.0000
H-4/3	1.00	0.98	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.0000
H-3/2	1.00	0.01	0.97	0.00	0.02	0.00	0.00	0.00	0.00	0.0000
H-2/1	1.00	0.01	0.00	0.00	0.02	0.00	0.00	0.97	0.00	0.0000
A-2/1	1.00	0.02	0.00	0.00	0.04	0.00	0.00	0.94	0.00	0.0000
A-1/SPond	1.00	0.95	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.0000
FG-5/4	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
FG-4/3	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
FG-3/2	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
FG-2/1	1.00	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
FG-1/NPond	1.00	0.95	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.0000
SPond/NPond	1.00	0.01	0.00	0.00	0.06	0.00	0.00	0.93	0.25	0.0000
SPond/SP-22	1.00	0.01	0.95	0.00	0.05	0.00	0.00	0.00	0.01	0.0000
NPond/SP-20	1.00	0.01	0.00	0.00	0.26	0.00	0.00	0.73	0.06	0.0000
RTPond/LA-1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.26	0.0000
LA-1/2	1.00	0.01	0.00	0.00	0.92	0.07	0.00	0.00	0.38	0.0000
LA-2/3	1.00	0.01	0.00	0.00	0.76	0.23	0.00	0.00	0.44	0.0000
LA-3/SP-19	1.00	0.01	0.00	0.00	0.68	0.31	0.00	0.00	0.55	0.0000

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Conduit Surcharge Summary
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Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
SP-25/24	0.13	0.13	0.13	0.01	0.01
SP-24/23	0.36	0.36	0.36	0.60	0.19
SP-23/22	1.73	1.73	1.74	0.65	0.20
SP-22/21	2.67	2.67	2.67	0.01	0.01
SP-21/20	3.03	3.03	3.03	0.01	0.01
SP-20/19	3.42	3.42	3.42	4.04	3.33
SP-19/18	3.42	3.42	3.42	0.01	0.01
SP-18/17	3.81	3.81	3.81	3.77	3.66
SP-17/16	3.68	3.68	3.68	3.99	3.66
SP-16/15	3.68	3.68	3.68	0.01	1.93
SP-15/14	3.61	3.61	3.61	3.45	3.61
SP-14/13	3.61	3.61	3.61	0.09	2.92
SP-13/12	2.10	2.10	2.10	4.21	2.10

Option 3 - 100-Year Storm

SP-12/11	2.10	2.10	2.10	0.01	2.07
SP-11/10	1.71	1.71	1.71	0.11	1.71
SP-10/9	0.63	0.63	0.63	4.07	0.63
SP-9/8	0.61	0.61	0.61	0.01	0.61
SP-8/7	0.01	0.01	0.01	0.83	0.01
SP-7/6	0.01	0.01	0.01	1.30	0.01
SP-4/3	0.01	0.01	0.01	0.44	0.01
H-3/2	0.16	0.16	0.16	0.01	0.01
H-2/1	0.29	0.29	0.29	0.01	0.01
A-2/1	2.30	2.30	2.30	0.01	0.01
A-1/SPond	1.91	1.91	1.91	0.01	0.01
SPond/NPond	1.49	1.49	1.49	0.01	0.01
NPond/SP-20	4.15	4.15	4.15	0.02	0.01
RTPond/LA-1	2.96	2.96	2.96	5.87	2.96
LA-1/2	2.61	2.61	2.61	2.92	2.40
LA-2/3	0.95	0.95	0.95	3.37	0.95
LA-3/SP-19	0.95	0.95	0.95	0.01	0.01

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Analysis begun on:  Wed Jun 26 14:15:05 2013
Analysis ended on:  Wed Jun 26 14:15:27 2013
Total elapsed time: 00:00:22
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APPENDIX C

Construction Cost Estimates

LOUISIANA AND LOMAS STORM DRAIN IMPROVEMENTS
CITY OF ALBUQUERQUE PROJECT NO. 7304.91

CONSTRUCTION COST ESTIMATE

Option 1

Date: **Wednesday, July 31, 2013**

BASE BID

BID ITEM NUMBER	ITEM ID NUMBER	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	ESTIMATED UNIT PRICE	ESTIMATED AMOUNT
1	4.010A	Construction Staking including staking of project, quantity verification and as-built information, compl.	1	LS	$15,000.00	$15,000.00
2	6.010	Construction Project Sign, including materials, installation, maintenance and removal, complete	2	EA	$636.93	$1,273.86
3	19.010	Construction Traffic Control & Barricading, including temporary traffic signalization any and all access signs, compl.	1	LS	$9,000.00	$9,000.00
4	201.010	Site Clearing and Grubbing, compl.	4	AC	$1,281.93	$5,691.77
5	202.011A	Remove and Dispose of Excess Excavation, complete	20,000	CY	$8.55	$171,000.00
6	343.020	Existing Pavement, Asphalt Concrete, up to 4" thick, sawcut, remove & dispose, complete	1,800	SY	$6.00	$10,800.00
7	410.010	Chain Link Fence, incl. post & hardware, cip.	17,800	SF	$4.00	$71,200.00
8	401.040A	Existing Chain Link Fence, including gates, remove & dispose, compl.	17,800	SF	$1.50	$26,700.00
9	630.010	NPDES Permitting/Compliance, complete	1	LS	$12,000.00	$12,000.00
10	625.010	Flood Protection, complete	1	LS	$7,500.00	$7,500.00
11	910.104	Drainline Removal, 21" to 48", excl. trenching, compl.	432	LF	$35.00	$15,120.00
12	340.030A	8" RPCC low flow channel, including 12" subgrade preparation, cip.	1,300	SY	$60.00	$78,000.00
13	343.050A	Existing PC Concrete, more than 4" thick, remove and dispose, compl.	980	SY	$10.02	$9,819.60

BID ITEM NUMBER	ITEM ID NUMBER	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	ESTIMATED UNIT PRICE	ESTIMATED AMOUNT
14	337.02A	6" RPCC flatwork, cip.	820	SY	$50.00	$41,000.00
15	510.110	Structural, Reinforced PC Concrete Wall, 4000psi, incl. formwork, cip.	869	CY	$500.00	$434,500.00
16	510.120	Wall Footing, Reinforced PC Concrete Footing, incl. formwork, cip.	963	CY	$500.00	$481,500.00
17	910.XXX	Trash Grate for Racetrack Pond, compl.	1	LS	$8,000.00	$8,000.00
18	910.XXX	Existing Racetrack Pond Trash Grate, Remove and Dispose, compl.	1	LS	$750.00	$750.00
19	910.XXX	Existing Storm Drain Pipe Improvements/Repairs, compl.	1	LS	$100,000.00	$100,000.00
20	1011.010	Seeding, Class "A", native, cip.	4	AC	$1,630.34	$6,521.36

Subtotal of Bid Items 1-20 $1,505,376.59

21	621.4.1	Mobilization (not to exceed 5% of above Subtotal)	1	LS	$75,268.83	$75,268.83

a) BASE BID: Subtotal of Bid Item No. 1 through Bid Item No. 21 $1,580,645.42

b) CONTINGENCIES @ 20% $316,129.08

c) BASE BID ALLOWANCES:

Project Sign Screen, 2 @ $ 500.00 per sign	$1,000.00	
Utility Relocation	$10,000.00	
Lab Testing	$30,000.00	
Total Base Bid Allowances		$41,000.00

d) BASE BID SUBTOTAL:
Line a) Base Bid plus Line b) Contingencies plus Line c) Base Bid Allowances: $1,937,774.50

e) BASE BID - NEW MEXICO GROSS RECEIPTS TAX (NMGRT):
on amount on Line d) Base Bid Subtotal at 7.00% $135,644.22

f) BASE BID TOTAL: - Line d) Subtotal plus Line e) NMGRT: $2,073,418.72

LOUISIANA AND LOMAS STORM DRAIN IMPROVEMENTS
CITY OF ALBUQUERQUE PROJECT NO. 7304.91

CONSTRUCTION COST ESTIMATE

Option 2

Date: **Wednesday, July 31, 2013**

BASE BID

BID ITEM NUMBER	ITEM ID NUMBER	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	ESTIMATED UNIT PRICE	ESTIMATED AMOUNT
1	4.010A	Construction Staking including staking of project, quantity verification and as-built information, compl.	1	LS	$22,000.00	$22,000.00
2	6.010	Construction Project Sign, including materials, installation, maintenance and removal, complete	2	EA	$636.93	$1,273.86
3	19.010	Construction Traffic Control & Barricading, including temporary traffic signalization any and all access signs, compl.	1	LS	$15,000.00	$15,000.00
4	201.010	Site Clearing and Grubbing, compl.	4	AC	$1,281.93	$5,691.77
5	202.011A	Remove and Dispose of Excess Excavation, complete	40,000	CY	$8.55	$342,000.00
6	343.020	Existing Pavement, Asphalt Concrete, up to 4" thick, sawcut, remove & dispose, complete	1,800	SY	$6.23	$11,214.00
7	410.010	Chain Link Fence, incl. post & hardware, cip.	17,800	SF	$4.00	$71,200.00
8	401.040A	Existing Chain Link Fence, including gates, remove & dispose, compl.	17,800	SF	$1.50	$26,700.00
9	630.010	NPDES Permitting/Compliance, complete	1	LS	$12,000.00	$12,000.00
10	625.010	Flood Protection, complete	1	LS	$10,000.00	$10,000.00
11	910.104	Drainline Removal, 21" to 48", excl. trenching, compl.	960	LF	$35.00	$33,600.00
12	340.030A	8" RPCC flatwork in channel, including low flow channel, including subgrade preparation, cip.	3,700	SY	$60.00	$222,000.00
13	343.050A	Existing PC Concrete, more than 4" thick, remove and dispose, compl.	2,700	SY	$10.02	$27,054.00
14	510.110	Structural, Reinforced PC Concrete, 4000psi, incl. formwork, cip.	1,760	CY	$500.00	$880,000.00
15	510.120	Wall Footing, Reinforced PC Concrete, incl. formwork, cip.	1,760	CY	$500.00	$880,000.00
16	701.120	Trenching, Backfilling & Compaction, 18" to 36" sewer pipe, 8' to 12' in depth, pipe not incl., compl.	725	LF	$27.25	$19,756.25
17	701.160	Trenching, Backfilling & Compaction, 42" to 60" sewer pipe, 8' to 12' in depth, pipe not incl., compl.	500	LF	$34.52	$17,260.00
18	910.017A	36" Reinforced Concrete Pipe, Class IV, furnish & place in open trench, cip.	725	LF	$80.00	$58,000.00
19	910.220	48" Reinforced Concrete Pipe, Class IV, furnish & place in open trench, cip.	500	LF	$139.09	$69,545.00

BID ITEM NUMBER	ITEM ID NUMBER	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	ESTIMATED UNIT PRICE	ESTIMATED AMOUNT
20	910.XXX	Trash Grate for Racetrack Pond, compl.	1	LS	$15,000.00	$15,000.00
21	910.XXX	Existing Racetrack Pond Trash Grate, Remove and Dispose, compl	1	LS	$1,500.00	$1,500.00
22	910.XXX	Existing Storm Drain Pipe Improvements/Repairs, compl.	1	LS	$100,000.00	$100,000.00
23	1011.010	Seeding, Class "A", native, cip.	4	AC	$1,630.34	$6,521.36
					Subtotal of Bid Items 1-23	$2,847,316.24
24	621.4.1	Mobilization (not to exceed 5% of above Subtotal)	1	LS	$142,365.81	$142,365.81

a) BASE BID: Subtotal of Bid Item No. 1 through Bid Item No. 24 — $2,989,682.05

b) CONTINGENCIES @ 20% — $597,936.41

c) BASE BID ALLOWANCES:

Project Sign Screen, 2 @ $ 500.00 per sign	$1,000.00	
Utility Relocation	$10,000.00	
Lab Testing	$30,000.00	
Total Base Bid Allowances		$41,000.00

d) BASE BID SUBTOTAL:
Line a) Base Bid plus Line b) Contingencies plus Line c) Base Bid Allowances: — $3,628,618.46

e) BASE BID - NEW MEXICO GROSS RECEIPTS TAX (NMGRT):
on amount on Line d) Base Bid Subtotal at 7.00% — $254,003.29

f) BASE BID TOTAL: - Line d) Subtotal plus Line e) NMGRT: — $3,882,621.75

LOUISIANA AND LOMAS STORM DRAIN IMPROVEMENTS
CITY OF ALBUQUERQUE PROJECT NO. 7304.91

CONSTRUCTION COST ESTIMATE

Option 3

Date: **Wednesday, July 31, 2013**

BASE BID

BID ITEM NUMBER	ITEM ID NUMBER	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	ESTIMATED UNIT PRICE	ESTIMATED AMOUNT
1	4.010A	Construction Staking including staking of project, quantity verification and as-built information, compl.	1	LS	$40,000.00	$40,000.00
2	6.010	Construction Project Sign, including materials, installation, maintenance and removal, complete	6	EA	$636.93	$3,821.58
3	19.010	Construction Traffic Control & Barricading, including temporary traffic signalization any and all access signs, compl.	1	LS	$90,000.00	$90,000.00
4	201.010	Site Clearing and Grubbing, compl.	4	AC	$1,281.93	$5,691.77
5	202.011A	Remove and Dispose of Excess Excavation, complete	40,000	CY	$8.55	$342,000.00
6	301.020	Subgrade Prep. 12" at 95% compaction, cip.	16,760	SY	$2.00	$33,520.00
7	302.010	Aggregate Base Course, crushed, 6" at 95% compaction, cip.	16,760	SY	$6.93	$116,146.80
8	336.023	Asphalt Concrete Pavement, SP-III, 2-1/2 inch thick, machine laydown, cip.	50,280	SY	$11.00	$553,080.00
9	336.010	Prime Coat, emulsified asphalt, cip.	16,760	SY	$0.42	$7,039.20
10	336.120	Tack Coat, cationic emulsified asphalt, cip.	33,520	SY	$0.37	$12,402.40
11	340.010	Sidewalk, 4" thick, Portland Cement Concrete, incl. subgrade compaction, cip. SD2430	2,795	SY	$40.09	$112,051.55
12	340.050	Curb & Gutter, Standard, Portland Cement Concrete, incl. subgrade preparation, cip. SD2415	4,190	LF	$20.31	$85,098.90
13	343.020	Existing Pavement, Asphalt Concrete, up to 4" thick, sawcut, remove & dispose, complete	1,800	SY	$6.23	$11,214.00
14	343.030	Existing Pavement, Asphalt Concrete, more than 4" thick, sawcut, remove & dispose, complete	16,760	SY	$9.51	$159,387.60
15	343.080	Existing Curb & Gutter or Valley Gutter, PC Concrete, remove & dispose, compl.	4,190	LF	$6.42	$26,899.80
16	343.085	Existing Sidewalk, 4" PC Concrete, remove & dispose, compl.	2,795	SY	$9.34	$26,105.30
17	410.010	Chain Link Fence, incl. post & hardware, cip.	17,800	SF	$4.00	$71,200.00
18	401.040A	Existing Chain Link Fence, including gates, remove & dispose, compl.	17,800	SF	$1.50	$26,700.00
19	630.010	NPDES Permitting/Compliance, complete	1	LS	$30,000.00	$30,000.00

BID ITEM NUMBER	ITEM ID NUMBER	ITEM DESCRIPTION	ESTIMATED QUANTITY	UNIT	ESTIMATED UNIT PRICE	ESTIMATED AMOUNT
20	625.010	Flood Protection, complete	1	LS	$18,000.00	$18,000.00
21	910.104	Drainline Removal, 21" to 48", excl. trenching, compl.	432	LF	$35.00	$15,120.00
22	340.030A	8" RPCC flatwork in channel, including low flow channel, including subgrade preparation, cip.	3,700	SY	$60.00	$222,000.00
23	343.050A	Existing PC Concrete, more than 4" thick, remove and dispose, compl.	2,700	SY	$10.02	$27,054.00
24	510.110	Structural, Reinforced PC Concrete, 4000psi, incl. formwork, cip.	1,760	CY	$500.00	$880,000.00
25	510.120	Wall Footing, Reinforced PC Concrete, incl. formwork, cip.	1,760	CY	$500.00	$880,000.00
26	701.160	Trenching, Backfilling & Compaction, 42" to 60" sewer pipe, 8' to 12' in depth, pipe not incl., compl.	690	LF	$28.59	$19,727.10
27	701.170	Trenching, Backfilling & Compaction, 42" to 60" sewer pipe, 12' to 16 ' in depth, pipe not incl., compl.	1,000	LF	$36.39	$36,390.00
28	701.170A	Trenching, Backfilling & Compaction, 42" to 60" sewer pipe, 16' to 20 ' in depth, pipe not incl., compl.	1,000	LF	$66.00	$66,000.00
29	701.170B	Trenching, Backfilling & Compaction, 42" to 60" sewer pipe, over 20 ' in depth, pipe not incl., compl.	1,500	LF	$90.00	$135,000.00
30	910.022	48" Reinforced Concrete Pipe, Class IV, furnish & place in open trench, cip.	4,190	LF	$139.09	$582,787.10
31	910.XXX	Trash Grate for Racetrack Pond, compl.	1	LS	$8,000.00	$8,000.00
32	910.XXX	Existing Racetrack Pond Trash Grate, Remove and Dispose, compl	1	LS	$750.00	$750.00
33	910.XXX	Existing Storm Drain Pipe Improvements/Repairs, compl.	1	LS	$100,000.00	$100,000.00
34	920.150A	Manhole, 6' dia., Type "C" or "E", any depth, cip. SD2101	12	EA	$2,010.80	$24,129.60
35	1011.010	Seeding, Class "A", native, cip.	4	AC	$1,630.34	$6,521.36
					Subtotal of Bid Items 1-35	$4,773,838.06
36	621.4.1	Mobilization (not to exceed 5% of above Subtotal)	1	LS	$238,691.90	$238,691.90

a) BASE BID: Subtotal of Bid Item No. 1 through Bid Item No. 36 $5,012,529.96

b) CONTINGENCIES @ 20% $1,002,505.99

c) BASE BID ALLOWANCES:

Project Sign Screen, 6 @ $ 500.00 per sign	$3,000.00	
Utility Relocation	$25,000.00	
Lab Testing	$75,000.00	
Total Base Bid Allowances		$103,000.00

d) BASE BID SUBTOTAL:
Line a) Base Bid plus Line b) Contingencies plus Line c) Base Bid Allowances: $6,118,035.95

e) BASE BID - NEW MEXICO GROSS RECEIPTS TAX (NMGRT):
on amount on Line d) Base Bid Subtotal at 7.00% $428,262.52

f) BASE BID TOTAL: - Line d) Subtotal plus Line e) NMGRT: $6,546,298.47

APPENDIX D

EXPO On-Site Storm Drain Condition Assessment

Solutions for Today…

Vision for Tomorrow

July 31, 2013

Kellie Shaw, EI
City of Albuquerque
Department of Municipal Development
PO Box 1293
Albuquerque, NM 87103

Re: EXPO On-Site Storm Drain Condition Assessment
SEC# 113108

Dear Ms. Shaw:

We are submitting this letter report pursuant to the Additional Service Authorization No. 2 for the City of Albuquerque Project Number 7304.91, Lomas and Louisiana Storm Drain Improvements. The additional services included in this authorization supplement the "Final Design Analysis Report for Storm Water Quality Improvements at Lomas and Louisiana." Modifications to the Racetrack Detention Basin are proposed in the report for the primary purpose of improving storm water quality. As stated in the report, the proposed improvements are contingent upon the condition of the existing EXPO on-site storm drain pipe. The purpose of this additional service is to assess the condition of the aforementioned on-site storm drain pipe and determine its suitability for use in conjunction with the proposed improvements. In order to assess its condition the storm drain pipe was cleaned and videotaped. Approximately 4,700 linear feet of storm drain pipe consisting of 12 pipe segments was cleaned and videotaped between July 3 and July 12, 2013. Upon completion of the cleaning and videotaping, the video was reviewed to inspect the pipe. This letter report presents the video review findings and recommendations regarding continued use of the storm drain pipe. The overall condition of the on-site storm drain pipe is generally good; however, several issues require attention.

The primary issues of concern are pipe breaks, joints (including exposed gaskets and scour at joints), and several lateral connections of unknown sources. While the joints may be repaired from the interior of the pipe with application of an epoxy-based grout, the pipe breaks will require that pipe be exposed and repaired from the exterior. In some cases, replacement of entire pipe segments will be necessary. Further investigation of the laterals observed in the video will be required during the design phase to determine the source of each. If it is determined that a lateral conveys illicit discharges into the City of Albuquerque MS4, the lateral will be permanently disconnected from the City MS4. The means of disconnection will be determined during design. If the lateral does not convey illicit discharges, it should be cleaned and the pipe penetration into the main storm drain pipe should be grouted with an epoxy-based grout.

Other concerns observed in the video review include the following:

- Pipe scour: The pipe scour is severe enough in some areas to have resulted in exposed reinforcing. The pipe scour can be addressed with application of an epoxy-based grout.

2201 San Pedro Drive, NE Building 4, Suite 200 Albuquerque, NM 87110
Tel: 505.884.0700 MichelleW@smithengineering.pro Fax: 505.884.2376

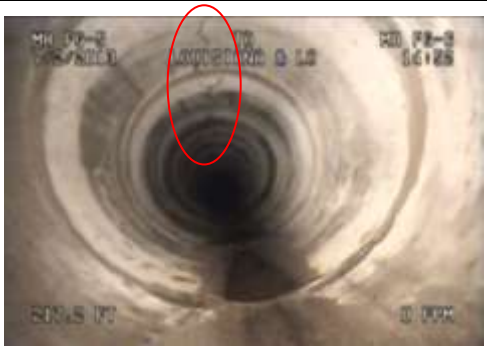
- Manhole shaping: Many manholes observed are inadequately shaped. The manholes can be improved by shaping the inside of the manhole with concrete.
- Buried manholes: The manholes should be uncovered and adjusted to grade. Removal and replacement of the existing surface treatment will be required and new manhole rings, covers, and concrete collars should be installed. Bolted manhole covers should be used to limit access.
- Longitudinal cracking: Longitudinal cracking along the soffit of many pipe segments was observed. The cracking does not appear to pose danger of failure, and should be monitored.

Information on specific items observed in the video review is provided in the individual pipe segment summaries below. The summaries begin with the most upstream pipe segment of the on-site system, and generally proceed in the downstream direction. The pipe segment numbering corresponds to the order in which the videotaping was completed. See the enclosed sketch (Sketch 1: EXPO On-Site Storm Drain System CCTV Review) for reference on manhole and item locations described in the summaries.

SEGMENT 1: Manhole FG-5 to Manhole FG-6

Segment consists of 48" diameter RCP. Video of this segment proceed in the upstream direction from manhole FG-5 east to manhole FG-6.

LOCATION	OBSERVATION	COMMENT	PHOTO
0+13	Lateral connection from the south (right). Source of lateral is unknown. Material appears to be corrugated metal pipe (CMP).	Source of lateral should be determined. If from illicit source, connection will be eliminated.	 Lateral connection.
0+16	Lateral connection from the north (left). Source of lateral is unknown. Material appears to be CMP.	Source of lateral should be determined. If from illicit source, connection will be eliminated.	 Lateral connection.

LOCATION	OBSERVATION	COMMENT	PHOTO
STA. 0+4 to STA. 3+05	Longitudinal cracking along pipe soffit.	Pipe does not appear to be in danger of failure and should be monitored.	 Longitudinal cracking.
STA. 0+4 to STA. 3+05	Exposed gaskets and erosion of joint grout at several locations.	Joints should be sealed with epoxy based grout.	 Exposed gasket.
STA. 0+4 to STA. 3+05	Scour along pipe invert and sides, and is most severe at joints.	Scour areas should be sealed with epoxy-based grout.	 Scour at joint.  Close-up of scour at pipe invert.

LOCATION	OBSERVATION	COMMENT	PHOTO
3+05 (FG-6)	No forming observed at manhole FG-6.	The manhole walls and invert should be reshaped to improve hydraulic efficiency and eliminate the standing water. The manhole should also be cleaned.	 Manhole FG-6.

SEGMENT 4: Manhole FG-5 to Manhole FG-4

Segment consists of 48" diameter RCP. Video and stationing of this segment proceed in the downstream direction from manhole FG-5 west to manhole FG-4.

LOCATION	OBSERVATION	COMMENT	PHOTO
0+22	Lateral connection from the south (right). Source of lateral is unknown. Wire mesh observed around the perimeter of the pipe penetration.	Wire mesh should be removed and the perimeter of the pipe penetration should be grouted with an epoxy-based grout. Source of lateral should be determined. If from illicit source, connection will be eliminated.	 Lateral connection.
2+17	Utility pipe crossing through top of 48" RCP.	Utility pipe should be further investigated. 48" pipe should be sealed with epoxy-based grout.	 Utility pipe crossing.

LOCATION	OBSERVATION	COMMENT	PHOTO
3+55 (FG-4A)	Buried manhole (FG-4A). Standing water present within manhole.	The manhole should be uncovered and adjusted to grade. The manhole walls and invert should be reshaped to improve hydraulic efficiency and eliminate the standing water.	 Showing upcoming manhole (FG-4A) and standing water in manhole.
STA. 0+4 To STA. 5+02	Longitudinal cracking observed along pipe soffit.	Pipe does not appear to be in danger of failure and should be monitored.	 Longitudinal cracking.
STA. 0+4 To STA. 5+02	Exposed gaskets, grout erosion, and cracking observed at several joints.	Joints should be sealed with epoxy-based grout.	 Cracking and grout erosion at joint.

SEGMENT 8: Manhole FG-4 to Racetrack Detention Basin

Segment consists of 36" diameter RCP. Markings observed on the inside of the pipe indicate pipe was installed in 1982. Video and stationing of this segment proceed in the upstream direction from manhole FG-4 southeast to the Racetrack Detention Basin.

LOCATION	OBSERVATION	COMMENT	PHOTO
STA. 0+4 to STA. 7+46	Longitudinal cracking observed along pipe soffit.	Pipe does not appear to be in danger of failure and should be monitored.	 Longitudinal cracking.

SEGMENT 5: Manhole FG-4 to Manhole FG-3

Segment consists of 48" diameter RCP. Video and stationing of this segment proceed in the downstream direction from manhole FG-4 west to manhole FG-3.

LOCATION	OBSERVATION	COMMENT	PHOTO
STA. 0+22	CMP lateral from the south.	Source of lateral should be determined. If from illicit source, connection will be eliminated. Epoxy-based grout should be placed around the pipe penetration.	 CMP lateral.

LOCATION	OBSERVATION	COMMENT	PHOTO
STA. 0+22	CMP lateral from the south.	Source of lateral should be determined. If from illicit source, connection will be eliminated. Epoxy-based grout should be placed around the pipe penetration.	 Close-up of CMP lateral pipe penetration.
STA. 0+47	Pitting in pipe with exposed reinforcing.	Pitting should be filled with epoxy-based grout.	 Pitting in pipe.
STA. 0+4 to STA. 1+70	Longitudinal cracking observed along pipe soffit.	Pipe does not appear to be in danger of failure and should be monitored.	 Longitudinal cracking.
STA. 0+4 to STA. 1+70	Some exposed gaskets observed.	Gaskets should be re-sealed with epoxy-based grout.	 Exposed gasket.

LOCATION	OBSERVATION	COMMENT	PHOTO
STA. 0+4 to STA. 1+70	Scour observed along pipe invert and sides, and is most severe at joints.	Scour areas joints should be sealed with epoxy-based grout.	 Scour at joint.
1+70 (FG-3)	Incoming RCP from the south observed at manhole FG-3. No forming observed in manhole FG-3.	This pipe should be further investigated. Manhole walls and invert should be shaped to improve hydraulic efficiency.	 Manhole FG-3.

SEGMENT 6: Manhole FG-3 to FG-2

Segment consists of 48" diameter RCP. Markings observed on inside of pipe indicate installation in 1957. Video and stationing of this segment proceed in the downstream direction from manhole FG-3 north to manhole FG-2.

LOCATION	OBSERVATION	COMMENT	PHOTO
STA. 1+55 (FG-2B)	Buried manhole (FG-2B). A small diameter pipe crosses through the manhole.	The manhole should be uncovered and adjusted to grade. Epoxy-based grout should be applied at the penetration of the crossing pipe. The manhole should be re-shaped to improve hydraulic efficiency.	 Manhole FG-2B and crossing pipe.

LOCATION	OBSERVATION	COMMENT	PHOTO
STA. 1+92	Exposed reinforcing at the invert.	Area should be sealed with epoxy-based grout.	 Exposed reinforcing at pipe invert. Camera at bottom left corner.
STA. 0+4 to STA. 3+39	Longitudinal cracking along pipe soffit.	Pipe does not appear to be in danger of failure and should be monitored.	 Longitudinal crack at pipe soffit.
STA. 0+4 to STA. 3+39	Exposed gaskets and grout erosion at several joints.	Gaskets should be re-sealed with epoxy-based grout.	 Close-up of joint.
STA. 0+4 to STA. 3+39	Scour along pipe invert and sides, greatest severity at joints.	Affected areas should be sealed with epoxy-based grout.	 Scour at pipe joint.

LOCATION	OBSERVATION	COMMENT	PHOTO
STA. 3+39 (FG-2)	No forming observed in manhole FG-2.	Manhole walls and invert should be shaped to improve hydraulic efficiency.	 Manhole FG-2.

SEGMENT 7: Manhole FG-2 to Existing Drop Inlet

Segment consists of 24" diameter RCP. Markings observed on inside of pipe indicate installation in 1984. Video and stationing of this segment proceed in the upstream direction from manhole FG-2 east to the existing drop inlet (FG-2A) shown on the enclosed sketch.

LOCATION	OBSERVATION	COMMENT	PHOTO
STA. 1+59	Hanging gasket and some erosion at joint.	Joint should be re-sealed with an epoxy-based grout.	 Hanging gasket at joint.
STA. 2+39	Pipe scour and exposed reinforcing on pipe side.	Area should be filled in with an epoxy-based grout.	 Exposed reinforcing.

LOCATION	OBSERVATION	COMMENT	PHOTO
STA. 2+62	Buried drop inlet. Corrugated metal sheeting appears to have been placed over the drop inlet.	Inlet should be permanently sealed.	 Top inside view of buried drop inlet showing corrugated metal sheeting.
STA. 3+43 (FG-2A)	Drop inlet appears to have been covered with plywood. Small PVC pipe penetration at invert along east wall of existing drop inlet (FG-2A).	Drop inlet should be permanently sealed. Source of PVC pipe should be determined. If from illicit source, connection will be eliminated.	 PVC pipe at invert of drop inlet.
STA. 0+6 to STA. 3+43	Grout erosion at several joints.	Joints should be re-sealed with epoxy-based grout.	 Close-up of joint.

SEGMENT 8: Manhole FG-2 to Manhole FG-1C

Segment consists of 48" diameter RCP. Video and stationing of this segment proceed in the downstream direction from manhole FG-2 west to a buried manhole discovered at STA. 6+65 (manhole FG-1C).

LOCATION	OBSERVATION	COMMENT	PHOTO
STA. 0+11	Standing water in pipe.	The standing water will need to be removed to investigate the cause of ponding. Reshaping of invert may eliminate ponding.	 Standing water in pipe.
STA. 0+45	RCP lateral connection from the south (left).	Source of lateral should be determined. If from illicit source, connection will be eliminated.	 Inside of lateral.
STA. 0+76	Broken pipe near soffit.	Pipe should be exposed and repaired from the exterior.	 Broken pipe with rebar.

LOCATION	OBSERVATION	COMMENT	PHOTO
STA. 2+49	Broken pipe near soffit. Evidence of seepage in 48" RCP is present.	Pipe should be exposed and repaired from the exterior.	 Broken pipe.
STA. 2+72	RCP lateral connection from the south (left).	Source of lateral should be determined. If from illicit source, connection will be eliminated.	 Lateral connection.
STA. 3+72 (FG-1D)	Buried manhole (FG-1D). RCP lateral connection from the south (left).	Manhole should be uncovered and adjusted to grade. Source of lateral should be determined. If from illicit source, connection will be eliminated.	 Connecting RCP from south visible on the left in FG-1D.

LOCATION	OBSERVATION	COMMENT	PHOTO
STA. 4+32	Broken pipe. There appears to be a build-up of lean fill at the invert of the 48" RCP which may be the result of an attempt to seal the broken pipe. The built up lean fill has caused ponding upstream of the broken pipe.	The pipe segment should be removed and replaced to repair.	 Broken pipe with surface of another pipe visible.  Build-up in pipe at broken section.
STA. 5+39	Standing water in pipe.	The standing water will need to be removed to investigate the cause of ponding. Reshaping of invert may eliminate ponding.	 Standing water.

LOCATION	OBSERVATION	COMMENT	PHOTO
STA. 6+65 (FG-1C)	Buried manhole (FG-1C).	Manhole should be uncovered and adjusted to grade. Manhole walls and invert should be shaped to improve hydraulic efficiency.	 Manhole FG-1C.
STA. 0+4 to STA. 6+65	Longitudinal cracking observed along pipe soffit.	Pipe does not appear to be in danger of failure and should be monitored.	 Longitudinal cracking at top of pipe.
STA. 0+4 to STA. 6+65	Exposed gaskets, grout erosion, and cracking observed on joints several locations.	Joints should be sealed with epoxy-based grout.	 Crack at joint.
STA. 0+4 to STA. 6+65	Scour observed along pipe invert and sides, and is most severe at joints. Scouring at joints has caused standing water in some area.	Scour areas joints should be sealed with epoxy-based grout.	 Scour at pipe joint. Standing water upstream of joint visible.

LOCATION	OBSERVATION	COMMENT	PHOTO
STA. 0+4 to STA. 6+65	Scour observed along pipe invert and sides, and is most severe at joints. Scouring at joints has caused standing water in some area.	Scour areas joints should be sealed with epoxy-based grout.	 Close-up of joint pictured in previous photo.

SEGMENT 9: Manhole FG-1 to Manhole FG-1C

Segment consists of 48" diameter RCP. Video and stationing of this segment proceed in the upstream direction from manhole FG-1 east to a buried manhole at STA. 7+45 (FG-1C).

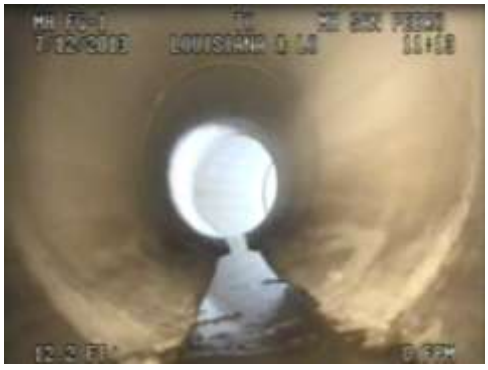
LOCATION	OBSERVATION	COMMENT	PHOTO
STA. 1+48 (FG-1A)	Buried manhole (FG-1A). Low point observed at invert.	Manhole should be uncovered and adjusted to grade. Manhole walls and invert should be shaped to improve hydraulic efficiency.	 Upcoming manhole (FG-1A) and low point.
STA. 4+42 (FG-1B)	Buried manhole (FG-1B). Low point observed at invert.	Manhole should be uncovered and adjusted to grade. Manhole walls and invert should be shaped to improve hydraulic efficiency.	 Showing upcoming manhole (FG-1B).

LOCATION	OBSERVATION	COMMENT	PHOTO
STA. 2+59 to STA. 6+74	Eleven lateral connections along length of segment. All pipe penetrations appear to be at the top of the pipe. Exposed reinforcing, concrete deterioration, and cracks propagating from the penetration were observed in all locations.	These laterals should be investigated further during the design phase to determine the source of each. If from illicit sources, connections will be eliminated.	 Lateral connection.  Lateral connection.
STA. 0+4 to STA. 7+45	Longitudinal cracking observed along pipe soffit.	Pipe does not appear to be in danger of failure and should be monitored.	 Longitudinal cracking.
STA. 0+4 to STA. 7+45	Exposed gaskets, grout erosion, and cracking observed at several joints.	Joints should be sealed with epoxy-based grout.	 Grout erosion at joint.

LOCATION	OBSERVATION	COMMENT	PHOTO
STA. 0+4 to STA. 7+45	Scour observed along pipe invert and sides, and is most severe at joints. Scouring at joints has caused standing water in some areas.	Scour areas joints should be sealed with epoxy-based grout.	 Scour at joint.  Close-up of scour at joint pictured in previous photo.

SEGMENT 11: Manhole FG-1 to San Pedro North Detention Basin

Segment consists of 48" diameter RCP. Video and stationing of this segment proceed in the downstream direction from manhole FG-1 west to the San Pedro North Detention Basin.

LOCATION	OBSERVATION	COMMENT	PHOTO
STA. 0+4 to STA. 0+47	Scour and cracks in grout observed at joints.	Joints should be sealed with an epoxy-based grout.	 Scour at joint.

SEGMENT 10: Manhole FG-1 to Manhole FG-7

Segment consists of 48" diameter RCP. Video and stationing of this segment proceed in the upstream direction from manhole FG-1 northwest to the manhole FG-7.

LOCATION	OBSERVATION	COMMENT	PHOTO
STA. 0+47 (FG-7)	Two connecting pipes observed at manhole FG-7. A drop inlet southeast of manhole FG-7 is the source of one pipe. The source of the second pipe is unknown.	Source of second pipe should be investigated. If from illicit source, connection will be eliminated.	 Lateral connections within manhole FG-7.

SEGMENT 2: Manhole FG-8 to Manhole FG-8A

Segment consists of 24" diameter CMP. Video and stationing of this segment proceed in the downstream direction from manhole FG-8 west to manhole FG-8A.

LOCATION	OBSERVATION	COMMENT	PHOTO
FG-8	Connecting 24"CMP from the south (left).	Source of pipe should be investigated. If from illicit source, connection will be eliminated.	No photo available. Pipe was discovered during field investigation.
STA. 1+16	Standing water.	The 24" CMP was installed by EXPO New Mexico and is therefore not owned by the City of Albuquerque. No action will be taken to address the standing water.	 Standing water.

LOCATION	OBSERVATION	COMMENT	PHOTO
STA. 2+27	Standing water.	The 24" CMP was installed by EXPO New Mexico and is therefore not owned by the City of Albuquerque. No action will be taken to address the standing water.	 Standing water.
STA. 2+86	Standing water.	The 24" CMP was installed by EXPO New Mexico and is therefore not owned by the City of Albuquerque. No action will be taken to address the standing water.	 Standing water.

SEGMENT 3: Manhole FG-8A to San Pedro North Detention Basin

Segment consists of 24" diameter CMP. Video and stationing of this segment proceed in the downstream direction from manhole FG-8A west to the San Pedro North Detention Basin.

LOCATION	OBSERVATION	COMMENT	PHOTO
No adverse comments.			

This concludes the review of the existing EXPO on-site storm drain pipe. Also enclosed with this letter report are DVDs (2) of the storm drain videotaping. Please do not hesitate to contact us if you have any questions.

Sincerely,

Smith Engineering Company

Enclosure

cc: File

SAN PEDRO NORTH DETENTION BASIN

SAN PEDRO SOUTH DETENTION BASIN

RACETRACK DETENTION BASIN

EXISTING DROP INLET (FG-2A)

FG-1
FG-1A
FG-1B
FG-1C
FG-1D
FG-2
FG-2B
FG-3
FG-4
FG-4A
FG-5
FG-6
FG-7
FG-8
FG-8A

STA. 1+16 STANDING WATER
STA. 2+27 STANDING WATER
STA. 2+86 STANDING WATER
STA. 1+48 BURIED MANHOLE
STA. 2+59 LATERAL
STA. 3+01 LATERAL
STA. 3+31 LATERAL
STA. 3+68 LATERAL
STA. 3+94 LATERAL
STA. 4+42 BURIED MANHOLE
STA. 4+99 LATERAL
STA. 5+39 STANDING WATER
STA. 5+60 LATERAL
STA. 6+08 LATERAL
STA. 6+50 LATERAL
STA. 6+74 LATERAL
STA. 4+32 BROKEN PIPE
STA. 3+72 BURIED MANHOLE CONNECTING RCP FROM SOUTH
STA. 2+72 LATERAL
STA. 2+49 BROKEN PIPE
STA. 0+76 BROKEN PIPE
STA. 0+45, LT. LATERAL
STA. 0+11 STANDING WATER
STA. 1+59 HANGING GASKET
STA. 2+39 EXPOSED REINFORCING
STA. 2+62 BURIED DROP INLET
STA. 3+43 PVC PIPE FROM EAST
STA. 1+92 EXPOSED REINFORCING
STA. 1+55 BURIED MANHOLE
STA. 0+47 PITTING WITH EXPOSED REBAR
STA. 0+22, LT. CMP LATERAL
STA. 3+55 BURIED MANHOLE
STA. 2+17 PIPE CROSSING
STA. 0+22, RT. LATERAL
STA. 0+13, RT. CMP LATERAL
STA. 0+16, LT. CMP LATERAL

LOMAS
LOUISIANA
MARQUETTE

LEGEND

- EXISTING STORM DRAIN
- DIRECTION OF FLOW
- EXISTING STORM MANHOLE

EXPO ON-SITE STORM DRAIN

SCALE: 1" = 200'

SEC JOB # 113108

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CITY OF ALBUQUERQUE
DEPARTMENT OF MUNICIPAL DEVELOPMENT
ENGINEERING DIVISION
Date: JULY-2013

TITLE:
DESIGN ANALYSIS REPORT FOR
STORM WATER QUALITY IMPROVEMENTS
AT LOMAS AND LOUISIANA

EXPO ON-SITE STORM DRAIN SYSTEM CCTV REVIEW

City Project No.	Zone Map No.	Drawing No.
730491	K-18	SKETCH 1