

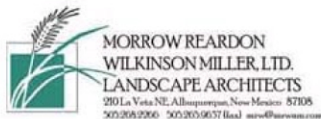
# **VILLAGE OF CORRALES SALCE PARK CONCEPT & DRAINAGE PLAN**

Prepared  
For:

**VILLAGE OF CORRALES  
and  
SOUTHERN SANDOVAL COUNTY  
ARROYO FLOOD CONTROL AUTHORITY  
(SSCAFCA)**



Prepared  
By:



**WHPacific**

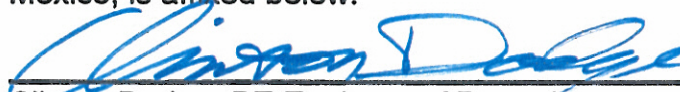


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CORDOVA, NM**

**November 2009**

# VILLAGE OF CORRALES SALCE PARK CONCEPT AND DRAINAGE REPORT

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal as a Professional Engineer, licensed to practice in the State of New Mexico, is affixed below.

  
Clinton Dodge, PE Engineer of Record  
License No. NM6410



This is a planning document. Nothing herein constitutes any commitment by the Village of Corrales or SSCAFCA to construct any project, study any area, acquire any right of way or enter into any contract. This park and drainage conceptual plan does not obligate the Village of Corrales or SSCAFCA in any way.

Drainage facility alignments, conveyance treatments, corridors, locations, rights-of-way and cost estimates are conceptual only, and may be altered or revised based upon future project analysis, changed circumstances or otherwise.

Land uses included in this document were assumed for the basis of hydrologic modeling only. This document does not grant "free discharge" from any proposed or existing development. Naturalistic channel treatments and piped storm drains are to be used for flood control conveyance, unless otherwise authorized by SSCAFCA.

The Salce Park Concept & Drainage Plan was accepted by the SSCAFCA Board of Directors on November 26, 2009.

By:   
David Stoliker, P.E. Executive Engineer

Date: 10-12-10

By:   
Mark Conkling Chairman

Date: 11/20/09

The Salce Park Concept & Drainage Plan was <sup>received</sup> accepted by the Village of Corrales on \_\_\_\_\_.

By:  Mayor Pro Tem  
Village of Corrales Title

Date: 9/23/10

**VILLAGE OF CORRALES  
SALCE PARK CONCEPT AND DRAINAGE PLAN**

**EXECUTIVE SUMMARY**

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**PURPOSE:**

This investigation was conducted at the request of the Village of Corrales to help address local drainage issues and develop concepts for Salce Park, an area subject to infrequent flooding and sediment deposition. The purpose is to identify concepts to develop the Salce Park site, in conjunction with addressing the drainage issues impacting the park site.

**BACKGROUND:**

The Salce Basin drains a 188 acre residential area entirely within the Village of Corrales. The upper basin drains to Salce Park and the lower basin drains to Loma Larga. (see Figure 1 and 2 in Appendix 'A' for location).

Regional Facilities: Regional improvements identified in the *Village of Corrales West Side Drainage Investigation* dated 12/21/1999 as SSCAFCA responsibility have been constructed by SSCAFCA. These manage the discharge into Corrales from west of the Village Limits (Thompson Fence Line). These include:

1. Dam No. 1 Storm Drain Outfall diverts the dam discharge to the Montoyas Arroyo. This facility eliminates the discharge in Unnamed Arroyo No. 5 that historically flowed across the Salce Park site and removed approximately 400 residences from the FEMA floodplain.
2. Dam No. 4 to Dam No. 1 Pipeline and Trail.
3. Urban Pond #4 and Tree Farm Pond Upgrades

Local Facilities: The *Village of Corrales West Side Drainage Investigation* recommended three Village actions:

1. Hydraulic Analysis of Corrales Main Canal, in conjunction with MRGCD
2. Implement Runoff Constraints
3. Address local drainage problem areas – approximately 29 were identified in the report.

Limited progress has been made on these recommendations and local problem areas remain an issue.

**SALCE PARK CONCEPTS:**

Salce Park amenities were identified in the Village's Salce Park Plan including playgrounds, playing fields, parking, ADA access, etc. Three conceptual park layouts were developed in conjunction with different drainage concepts estimated to cost approximately \$700,000.

1. PARK WITHOUT POND (Figure 3) – Salce Park detention pond not required, on-lot retention ponds and verification program required.
2. PARK WITH SINGLE DETENTION POND (Figure 4) – A single 10.8 AF Salce Park Pond north of Sagebrush Rd.
3. PARK WITH DUAL DETENTION PONDS (Figure 5) – Two Salce Park detention ponds totaling 10.8 AF located on each side of Sagebrush Rd.

## **DRAINAGE PLAN:**

Two options were identified to control local runoff in the Salce Park drainage basin:

1. **PARK WITHOUT POND** (Figure 6) – On-lot retention of the precipitation falling onto each property within the entire basin is required to eliminate off-site flow into the park site. This includes vacant lots, roads, and development prior to the 1989 ordinance. Village administrative and legal controls would be necessary to ensure 100% participation. This option is an implementation of the “low impact development (LID)” concept - keep the rain where it falls. LID reduces drainage infrastructure and improves downstream water quality – in this case the Corrales Main Canal and the Rio Grande. On-lot ponds are estimated to cost between \$3,000 and \$5,000 per lot to construct for those lots without on-lot ponds, plus an estimated \$250 to \$500 annual cost per lot for verification by the Village.
2. **PARK WITH POND(S)** (Figures 7, 8, 9 & 10) –The concept is to collect local runoff from the Upper Basin and the Calle Blanca Diversion area assuming on-lot ponds are ineffective and detain it in ponds at Salce Park with a restricted 5 cfs outlet. This requires paving and piping collection and conveyance of local flow into the ponds at Salce Park. Runoff in the area between Calle Blanca and Loma Larga for flood control would also be collected and detained in local ponds for restricted discharge at Loma Larga. The conceptual cost for the 188 acre Salce Basin is estimated to be \$5.6 million. Funding would be pursued by the Village.

## **LAND ART AS FLOOD CONTROL:**

Artist concepts are integrated into the conceptual drainage and park functions to increase community value without increasing cost. Paula Castillo, a New Mexico artist with local and international installations, provided concepts and interpretive designs that are integrated into the overall plan. The artist concept for the energy dissipater is shown on Figure 11.

**IMPLEMENTATION:** The Village of Corrales will be responsible for implementing the Salce Park Concept and Drainage Plan.

1. Village of Corrales – Determine and implement drainage option:
  - **PARK WITHOUT POND:** On-Lot retention pond program required.
  - **PARK WITH POND(S):** Drainage infrastructure required.
2. Village of Corrales – Develop Salce Park



## TABLE OF CONTENTS

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Page	
I. INTRODUCTION.....	1
A. LOCATION.....	1
B. REFERENCES.....	1
C. BACKGROUND .....	1
D. OBJECTIVE .....	2
E. CRITERIA AND ASSUMPTIONS.....	2
II. SALCE PARK DEVELOPMENT .....	4
A. SALCE PARK CONCEPT – PARK WITHOUT POND (FIGURE 3).....	4
B. SALCE PARK CONCEPT – PARK WITH POND(S) (FIGURES 4 AND 5) .....	5
III. DRAINAGE EVALUATION AND ANALYSIS.....	8
A. DRAINAGE OPTION – PARK WITHOUT POND (FIGURE 6) .....	8
B. DRAINAGE OPTION – PARK WITH POND(S) (FIGURES 7, 8, 9, 10).....	9
IV. LAND ART AS FLOOD CONTROL.....	12
A. ART AS FLOOD CONTROL - THE CONCEPT (FIGURE 11).....	12
B. ARTIST .....	12
C. SALCE PARK LAND ART CONCEPT .....	12
V. SUMMARY & IMPLEMENTATION .....	13

## LIST OF TABLES

---

TABLE 1	DRAINAGE INFRASTRUCTURE COST SUMMARY .....	11
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## APPENDICES

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### APPENDIX A – Figures

- Figure 1 – Location map
- Figure 2 – 100-YR Drainage Basins
- Figure 3 – Conceptual Landscape Plan – Park Without Pond
- Figure 4 – Conceptual Landscape Plan – Park With Dual Ponds
- Figure 5 – Conceptual Landscape Plan – Park With Single Pond
- Figure 6 – On-Lot Retention Concept
- Figure 7 – Upper Salce Drainage Infrastructure System
- Figure 8 – Park With Dual Ponds
- Figure 9 – Park With Single Pond
- Figure 10 – Pond Sections
- Figure 11 – Land Art as Flood Control

### APPENDIX B – Reference Documents

- APPENDIX C – Salce Park Project Plan, Meetings, & Coordination
- APPENDIX D – Salce Park Topographic Survey
- APPENDIX E – Calculations
- APPENDIX F – Land Art as Flood Control
- APPENDIX G – Digital Files

## ABBREVIATIONS & DEFINITIONS

Ac	Acre
AF	acre-feet of runoff (volume of water covering one acre, one foot deep)
Arroyo	Ephemeral stream in arid or semiarid southwestern U.S. typically with a flat floored channel and vertical or steeply cut banks that is usually dry.
BMP	Best Management Practice
CBC	Concrete Box Culvert
cfs	cubic feet per second – flow rate
cfs/Ac	cubic feet per second per acre
Clear Water Discharge	Runoff with minimal sediment (3% or less)
CMP	Corrugated Metal Pipe
CORR	City of Rio Rancho
CY	Cubic yard
Detention	Collection, temporary storage and controlled release of runoff.
Drainage Basin	Runoff areas, which flow to a specific facility.
Land Art	Art that helps improve the community's relationship with the natural world, where the landscape and the work of art are inextricably linked
Existing Runoff	Runoff based on development, surface modifications and construction in place at the time of analysis.
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
Flood	A general and temporary condition of partial or complete inundation of two or more acres of normally dry land or two or more properties from unusual and rapid accumulation or runoff of surface waters from any source.
Floodplain	Any land area susceptible to being inundated by flood waters from any source. (FEMA Definition)
fps	feet per second
Free Discharge	Runoff without peak flow and/or volume attenuation.
Interpretive Art Elements	A sculpture, drawing, painting or print, existing in a single copy or in a limited edition of 200 copies or fewer signed and consecutively numbered by the artist/author.
LID	Low Impact Development. A land planning and engineering design approach to managing stormwater runoff. This approach implements engineered small-scale hydrologic controls to replicate the pre-development hydrologic regime of watersheds through infiltrating, filtering, storing, evaporating, and detaining runoff close to its source.
Major Facilities	Facilities which generally meet one or more of the following criteria: Convey in excess of 500 cfs, are regional in nature; divert runoff; create drainage divides, pump stations; dams, public ponds.
MRGCD	Middle Rio Grande Conservancy District
Natural Conveyance	Existing historic arroyo or drainage course in the currently evolved natural state established by natural forces.
Naturalistic Conveyance	Constructed channel, swale or other conveyance system designed, and operated to maintain the appearance and aesthetic feel of a natural system. (native soils, native vegetation, meanders, variable widths, variable slopes)

On-Lot Pond	<p>-A pond on an individual lot to provide stormwater retention.</p> <p>-Per Section 18-30(b) of the Village Ordinance:  “Stormwater retention shall be in accordance with all applicable village, county, and state ordinances and requirements. All lots, improved or developed, shall retain localized storm water on site unless otherwise approved by the village engineer.”</p> <p>-Per the Village of Corrales Application for Residential Development Review Permit, Site Plan requirements item 6.e:  “Show on-site ponding area/localized storm water retention. All lots, improved or developed, shall retain localized storm water on site unless otherwise approved by the Village Engineer. The pond size is calculated at: total area of impervious surface on the lot x 2.66. ÷ 12 = cubic feet. This is the volume of water, which must be contained in an on-site pond. The pond should be located in such a manner that it will intercept the run off generated by development. Run off from driveways may not be diverted onto a publicly dedicated street or into an adjacent bar ditch. This means that the run off generated from the driveway must be contained on the lot in on-site ponds. Retention ponds shown on property are to be cleaned and maintained by the owners. Properties located west of Loma Larga Road are required to submit a grading and drainage plan prepared by a licensed engineer or architect with the construction drawings, along with a fee for review by the Village Engineer.”</p>
Q	Flow rate, cfs
RCP	Reinforced Concrete Pipe
Retention	Collection and storage of runoff with infiltration and evapotranspiration evacuation.
ROW	Right-of-way
SSCAFCA	Southern Sandoval County Arroyo Flood Control Authority
Stormwater Pond	Facility intended for sediment, erosion, and flood control, which is constructed less than 10 feet in height or can store less than 10 ac-ft of water.
Watershed	A comprehensive drainage area usually incorporating several drainage basins, typically with an outfall directly to the Rio Grande or into an independent system which conveys the watershed runoff to the Rio Grande.
Watershed Park	An interconnected linear park system promoting quality of life amenities using flood control right of way to maximize community value.

# VILLAGE OF CORRALES SALCE PARK CONCEPT AND DRAINAGE PLAN

## I. INTRODUCTION

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This report summarizes an investigation of park concepts and associated drainage plans for the Village of Corrales Salce Park. This investigation was conducted at the request of the Village to develop a conceptual plan to address park development in conjunction with resolution of drainage issues at the Salce Park Site.

### A. LOCATION

The Salce Park location and drainage basin areas are shown on Figures 1 and 2 (All figures are located in Appendix 'A'). The study area encompasses approximately 188 acres of residential property and includes all of the drainage associated with the Salce Park basin, from the upstream reach at the Corrales Village limits to the Corrales Main Canal at Loma Larga. The Salce Park drainage area is entirely within the Village of Corrales.

### B. REFERENCES

Available reports and plans for existing and proposed developments and facilities were assembled and reviewed and have been included in the development of the concepts. These reference documents are shown in the text as RD #XX, are listed in Appendix 'B' and are available at SSCAFCA.

### C. BACKGROUND

Salce Park is located in Unnamed Arroyo No. 5 in the alluvial fan area (also identified in this report as the Salce Arroyo) and is subject to flooding and associated sediment deposition during major storm events. Previous attempts to develop Salce Park have failed due to flooding and sediment deposition on the site (see articles referenced in RD#11 and #12). Currently, the site is used by the Village for maintenance storage.

Upstream improvements have reduced the historic drainage area and flows in the arroyo (see Figure No. 2). Dam No. 1 was originally constructed as part of Rio Rancho development to reduce developed flows entering Corrales from Rio Rancho.

The Village of Corrales West Side Drainage Investigation, dated 12/21/1999 (RD#8), identified regional improvements to manage the discharge into Corrales from west of the Village Limits (Thompson Fence Line) as SSCAFCA's responsibility. These improvements have been constructed by SSCAFCA and include:

1. Dam No. 1 Storm Drain Outfall diverts the dam discharge directly to the Montoyas Arroyo (See Figure 2 and RD #2,3,4). This facility eliminates the discharge in Unnamed Arroyo No. 5 that historically flowed across the



- Salce Park site and removed approximately 400 residences from the FEMA floodplain along the arroyo and the area to the southeast (RD #5).
2. Dam No. 4 to Dam No. 1 Pipeline and Trail.
  3. Grading upgrades at Dam No. 1 following the 2006 storm season to address local erosion.
  4. Urban Pond #4 and Tree Farm Pond Upgrades

The Village of Corrales West Side Drainage Investigation also recommended three Village actions. Limited progress has been made on these recommendations and local drainage problem areas remain an issue:

1. Hydraulic Analysis of Corrales Main Canal, in conjunction with MRGCD
2. Implement Runoff Constraints
3. Address local drainage problem areas – approximately 29 areas were identified in the report.

The Village developed a Salce Park Project Plan in 2008 identifying development of Salce Park as a priority project and requesting SSCAFCA's assistance. This study is the result of that request.

The Salce Arroyo is not in a platted public drainage easement and the arroyo flow path is across private property.

#### D. OBJECTIVE

The objective is to identify park concepts and drainage control systems that can be integrated to develop Salce Park.

#### E. CRITERIA AND ASSUMPTIONS

The criteria and assumptions used for this study are consistent with SSCAFCA and Village policies and ordinances, with drainage plans and studies in the SSCAFCA jurisdiction, with the Village's Salce Park Project Plan (Appendix 'C') and include:

- Aerial mapping from 2006 aerial photography, 2003 contours with 4' contour interval and the Topographic Survey of Salce Park (RD #7, included in Appendix 'D').
- Platting information from Sandoval County GIS, which is schematic in nature (i.e., does not represent surveyed property lines).
- The Salce Park Project Plan, developed by the Village (Appendix 'C')
- Coordination meetings were held with the Village Parks and Recreation and Public Works Maintenance staff to clarify items from the Salce Park Project Plan and to identify other maintenance, drainage, and operational needs for the Park. Meeting minutes and other items are included in Appendix 'C'.

- Hydrology is based on small watershed approximations as defined in the DPM (RD#1). Hydrology is based on the 100-year rainfall event of 2.8" precipitation in 24 hours.
- For the typical 1 dwelling unit per acre Corrales development without on-lot ponds and 35% impervious area, the unit discharge rate is estimated to be 2.6 cfs/acre and the unit runoff volume is estimated to be 0.1 AF/acre.
- Control of runoff to a public facility must be limited to the capacity of downstream facilities to accommodate the rate and volume of runoff. The entire Salce Basin (Figure 2) drains to the Corrales Main Canal along Loma Larga, where there is a known downstream capacity issue. Point discharge into the canal typically requires a license/permit from the MRGCD.
  - The discharge constraint for Salce Basin is assumed to be 5 cfs, based on previous licenses and the limited capacity available in the Corrales Main Canal.
  - The requirements to obtain a license/permit to discharge into the Corrales Main Canal are not addressed in this plan, but a permit may be required to implement the PARK WITH POND(s) Drainage Option.
- Use of Salce Park as a detention basin is assumed for the PARK WITH POND(s) drainage option. The property is owned by the Village, is appropriately located and will cost less than acquiring other property for drainage control.
- Areas that currently flow down the roadway that can be diverted into Salce Park will be diverted to take advantage of the Village owned property. The drainage area north of Camino Rayo del Sol, shown as "Calle Blanca Diversion Basin" on Figure 2, is diverted into the Salce Park detention basin. Without this diversion, this area drains eastward towards Loma Larga.
- The area between the park site and Loma Larga is included in the analysis. This area is part of the Salce Basin and requires control in order to meet the assumed discharge constraint of 5 cfs at the Corrales Main Canal along Loma Larga.
- Transporting water in the roadway (rather than paved side ditches) is preferred to reduce maintenance and to eliminate the drainage issues with driveway culverts. Some sort of rural type curb is assumed to provide adequate capacity and contain the flow. Inverted crown roadway sections also provide conveyance and are an option, but flow capacity is less than a curb and gutter section resulting in increased storm drain piping.
- Conveyance improvements are limited to public ROW (i.e. conveyance across private properties remains the responsibility of the property owners).
- Local and regional systems are combined in this investigation without segregation. Local systems are collection and conveyance of local runoff, typically less than 500 cfs or less than 2 AF storage volume. Regional facilities are typically larger.

- Storm water quality treatment volume is one-quarter inch runoff, approximately the average annual event of 0.6 in. This is assumed to be accomplished with extended detention in ponds.
- Land art concepts are integrated into the park and flood control functions to increase community value by adding artistic esthetics without increasing cost.

## II. SALCE PARK DEVELOPMENT

Conceptual park plans were developed by Morrow Reardon Wilkinson & Miller for each of the drainage concepts. Each of these concepts provides the amenities identified in the Salce Park Project Plan developed by the Village, which is outlined below and included in Appendix 'C':

1. Conduct a survey of the property
2. Engineer and design the property drainage on the 2.5 acre northern parcel and the 2.62 acre southern parcel.
3. Research easements between lots 82 and 83 in the Salida del Sol subdivision.
4. Design a drainage basin on the northern 2.5 acres allowing for 1.0 acre for playground and parking: .75 acre playground, 0.25 acre parking lot – also see below.
5. Establish a 5' jogging path along the perimeter of the entire park (North and South parcels)
6. Plan 0.5 acre for parking on each side of Sagebrush (formerly Pauline) – 0.25 on the North end of the southern parcel and 0.25 acre on the south end of the Northern parcel.
7. Install an irrigation system for both parcels.
8. Plan and design buffering on the north, south, and west sides of the Park— Sec. 18-40(d), Buffer Landscaping, of the Village Zoning Ordinance.
9. Fence the Park with 4' Horse Fence (may require a zoning variance).

Three conceptual plans were developed corresponding to the drainage concepts described in Section III: PARK WITHOUT POND, Park With Single Pond, Park With Dual Ponds.

The estimated cost for the development of Salce Park, not including drainage control components is \$700,000.

### A. SALCE PARK CONCEPT – PARK WITHOUT POND (FIGURE 3)

A regional detention pond is not required at Salce Park if the precipitation is retained in on-lot ponds on each property within the Drainage Area (See Section III.A for discussion of the PARK WITHOUT POND drainage option). With this option, the entire park property can be developed as an active park (See Figure 3). Small areas are

required to retain the precipitation falling on the park and adjacent public (roadway) property but have minimal impact on the park development.

The park concept is similar to the concepts incorporating regional detention ponds described in the following section, except the area north of Sagebrush Rd. is developed as an active turf playing field rather than a combination pond depression and open space infiltration area.

A playground is provided with separate play areas for 2-5 and 5-12 year old age groups with a shaded plaza separates the two age groups and bench seating for parents and other users. The playground is surrounded by decorative fencing to separate the play area from adjacent activities. Paved walkways surround the play area, providing an opportunity for adults to stroll and a fun route where children can ride tricycles and scooters. The paved walkways tie into an eight foot wide crusher fines jogging path which runs along the entire perimeter of the site. Dog waste bag dispensers and waste receptacles are provided at strategic locations along the path.

Where there is no existing fencing at the perimeter of the site, a metal rail horse fence is provided at the property line and is tied to existing fencing. Native plantings no more than 4' in height between the jogging path and perimeter fence provide a buffer between the park and the adjacent properties. Trees are strategically located to frame, but not block, the views to the Sandia Mountains.

Generous open space of turf-grass areas are provided on both sides of Sagebrush Drive, approximately 1 acre on the north side and 1.5 acres on the south side. These are level with the surrounding roads.

A parking area for approximately 12 vehicles is provided along Sagebrush Drive. In addition to the parking area, a separate drive lane provides access to the community mailboxes on the north side of Sagebrush Drive.

The jogging trail and buffer landscaping extend around the perimeter of the park. Land art is incorporated to create an interesting and beautiful amenity that is integral to the overall improvements.

Plantings are irrigated with an automatic irrigation system fed by water from the existing on-site well. Turf areas are irrigated with rotor heads. Trees and shrubs are irrigated with bubblers.

The park improvements comply with ADA requirements including handicap parking, accessible pedestrian routes and ramps, and accessible play equipment.

## **B. SALCE PARK CONCEPT – PARK WITH POND(S) (FIGURES 4 AND 5)**

Two park development options were developed incorporating a drainage infrastructure system at the site, one for a single pond option (Figure 4) and one for a dual pond option (Figure 5). The PARK WITH POND(S) drainage option is described



in Section III.B. The primary differences between the two park options are the location of the playground and the configuration of the open space and turf areas.

Each of the park options illustrated on Figures 4 and 5 incorporates similar features and facilities. Minor differences in layout, play areas, sediment and infiltration areas, etc. are shown in these different options but specific details would be addressed during design for construction.

A playground is provided with separate play areas for 2-5 and 5-12 year old age groups. On the single pond option, the playground is located south of Sagebrush Drive, adjacent to the open space turf area. On the dual pond option, the play area is on the north side of Sagebrush Drive, adjacent to the main drainage pond. A shaded plaza separates the two age groups and provides bench seating for parents and other users. The playground is surrounded by decorative fencing to separate the play area from adjacent activities and drainage features. Paved walkways surround the play area, providing an opportunity for adults to stroll and a fun route where children can ride tricycles and scooters. The paved walkways tie into an eight foot wide crusher fines jogging path which runs along the entire perimeter of the site. Dog waste bag dispensers are provided at strategic locations along the path.

Where there is no existing fencing at the perimeter of the site, a metal rail horse fence is provided at the property line and is tied to existing fencing. Native plantings no more than 4' in height between the jogging path and perimeter fence provide a buffer between the park and the adjacent properties. Trees are strategically located to frame, but not block, the views to the Sandia Mountains.

Both conceptual designs include a generous open space of turf-grass on the south side of Sagebrush Drive. In the single pond option the turf area is approximately 1.5 acres and is level with the surrounding roads. In the dual pond option, the turf area is approximately 1.5 acres and is depressed with grass side slopes and functions as an overflow drainage area when required.

A parking area is provided along Sagebrush Drive. On the single pond option, a parking area with 12 spaces is located on the south side of Sagebrush Drive because the primary park amenities are on the south. On the dual pond option, parking areas with 12 spaces are located on both sides of Sagebrush Drive, adjacent to the playground on the north and adjacent to the open turf area on the south. In addition to the parking area, a separate drive lane provides access to the community mailboxes on the north side of Sagebrush Drive.

The north portion of the park incorporates the main drainage pond. The jogging trail and buffer landscaping extend around the perimeter of the north portion of the park. The pond slopes are relatively flat and will be landscaped with native plantings with temporary irrigation until the plants are established. Land art is incorporated into the drainage facilities to create an interesting and beautiful amenity that is integral to the drainage function.

All planting is irrigated with an automatic irrigation system fed by water from the existing on-site well. Turf areas are irrigated with rotor heads. Trees and shrubs are irrigated with bubblers. Temporary irrigation is provided for native plants.

The park improvements comply with ADA requirements including handicap parking, accessible pedestrian routes and ramps, and accessible play equipment.

### III. DRAINAGE EVALUATION AND ANALYSIS

Two drainage concepts were considered to address runoff: PARK WITHOUT POND (requires on-lot retention) and a PARK WITH POND(S) (requires drainage infrastructure).

#### A. DRAINAGE OPTION – PARK WITHOUT POND (FIGURE 6)

If properly sized and maintained on-lot retention ponds were in place on all lots within the Salce Drainage Basin, runoff would be controlled and further drainage infrastructure would not be necessary at Salce Park.

On-lot retention of runoff is the concept of “capturing the rain where it falls”. This is a common element of Low Impact Development (LID), the intent being to minimize the development footprint. If all rainfall is retained without discharge, local runoff does not accumulate and the need for public collection, conveyance and downstream infrastructure for flood control is eliminated or minimized. On-Lot retention is also required for public facilities such as roadways, parks, open space, etc. For the Salce Park basin, the outfall to the Corrales Main Canal would also be eliminated.

On-lot ponds are one typical method of retaining the rainfall on-site. On-lot runoff retention can also consist of rain barrels, bio-swales, roof gardens, depressed corrals or gardens, etc. Village Ordinances require all development to retain all precipitation in on-lot ponds (Chapter 18, Article II, Section 18-30 of the Corrales Village Code, RD#10). In general, compliance with this ordinance appears to be sporadic and many properties may not have adequate ponds. A procedure to verify a continually effective on-lot pond system for all lots, including vacant lots, in the Village is not currently in place.

For on-lot facilities to qualify as flood control measures, all properties in the drainage basin must retain all precipitation and they must be properly sized and maintained. The Village is responsible for floodplain management including verification that local on-lot facilities are properly implemented. Also, on-lot retention would be required for roadways and the Salce Park site. Roadway ponds exist for some of the roadways in the Salce basin.

It is proposed that “land art as flood control” concepts would be integrated into the Salce Park on-site facilities to help promote the concept of on-lot retention within the community.

The Village of Corrales Westside Drainage Investigation (RD #8) identified a procedure to implement an on-lot pond system that would qualify as flood control. Annual verification administration, inspection, enforcement, etc. is estimated to cost approximately \$250 to \$500 per lot per year, not including the cost of initial implementation of on-lot ponds and a verification system for all properties in the

Salce drainage basin. On-lot ponds are estimated to cost between \$3,000 and \$5,000 per lot to construct.

## B. DRAINAGE OPTION – PARK WITH POND(S) (FIGURES 7, 8, 9, 10)

The option to include either a Single or Dual pond at Salce Park requires facilities to collect, convey, store and discharge runoff. This alternate assumes there are no on-lot ponds and no on-lot pond management program in place in the Village. Salce Park is identified as a detention basin with outlet flow restricted to 5 cfs. Additional ponds will be required between Salce Park and Loma Larga (Lower Salce Basin, Figure 2) to control the discharge from this area. The total cost for all components of the Drainage Infrastructure System is estimated to be \$5.6 million. The hydrology and system components are discussed below.

### 1. Drainage Basins and Hydrology

The study area was divided into drainage basins and runoff rates and volumes were estimated for each subbasin. Calculations related to the hydrology can be found in Appendix 'E'.

Three major drainage basins were defined (Figure 2): the Upper Salce Basin of 71 acres draining to Salce Park, the Calle Blanca Diversion Basin of 41 acres north of Camino Rayo del Sol that is proposed to be diverted via storm drain to Salce Park, and the Lower Salce Basin of 76 acres consisting of the area east of Calle Blanca to Loma Larga.

The Village of Corrales Escarpment Conceptual Drainage Facility Plan (RD#14), is being prepared concurrently with this report, and includes a small overlap (less than 5%) with the Upper Salce Basin and Calle Blanca Diversion area, as shown on Figure 3 in Appendix 'A'. If the Escarpment improvements are completed, these overlapping areas would be removed from the Salce Basins for design purposes.

### 2. Upper Salce Basin and Calle Blanca Diversion Collection System (Figure 7).

Collection and conveyance of the local flows is proposed to be via paved streets up to the capacity of the street and then in a combination street and storm drain. The collection and conveyance system is shown on Figure 7 and includes collection of runoff in the Calle Blanca Diversion Area and diversion to Salce Park. Flows in the existing arroyo are limited to the area immediately adjacent to the arroyo and will be collected where the arroyo crosses Loma del Oro and conveyed into the Salce Park pond via storm drain. This eliminates the arroyo crossing private property south of Loma del Oro and the need for a rundown at the northwest corner of the pond.

The Upper Salce and Calle Blanca Basins collection and conveyance systems cost estimate is approximately:

- Upper Salce Basin - \$1,000,000
- Calle Blanca Diversion area - \$700,000



### 3. Detention Pond System (Dual or Single Pond)

Two layout options for the detention pond system were evaluated; a dual pond and single pond layout. Both provide similar amenities, as discussed in Section II.B of this plan. These layout options are discussed below:

- Single Pond Layout Option (Figure 8).

The north side of the Salce Park site is used to detain flood runoff. All runoff would all be directed to the north pond. The area south of Sagebrush Rd. would be used exclusively for park improvements. A small on-lot pond would be required for the south area. The north pond volume is approximately 10.8 AF and is approximately 7' depth at the lower southeast end and 15' depth at the northwest corner.

Stormwater quality is provided by extended detention in the ponds allowing sediment fall-out and micro-pollutant treatment. Gross pollutant removal is accomplished with inclined ported risers, or similar, at the outlet structure. Energy dissipation at the storm drain inlet is accomplished with land art inspired structures discussed further in Section IV.

Discharge is limited to 5 cfs and is conveyed to Calle de Blas in a storm drain pipe. The time to drain is approximately 24 to 36 hours. The emergency spillway is located at the southeast corner and discharges to the historic flow path.

The conceptual cost for the drainage component of the Single Pond option is estimated to be approximately \$800,000.

- Dual Pond Layout Option (Figure 9).

Both the north side and the south side of the Salce Park site are used to detain flood runoff. The initial runoff would all be directed to the north pond with overflow during major events into the south pond. The north pond volume is approximately 4.9 AF and the south pond volume is approximately 5.1 AF. Both ponds are approximately 5' depth at the lower southeast end and 10' depth at the northwest corner. Both ponds are compatible with park improvements with consideration given to sediment deposition in the north pond and infrequent short term flooding in the south pond. The north pond would contain approximately the storm with a 0.1 annual probability (10-year storm).

Storm water quality is provided by extended detention in the ponds allowing sediment fall-out and micro-pollutant treatment. Gross pollutant removal is accomplished with inclined ported risers, or similar, at the outlet structures. Energy dissipation at the storm drain inlet is accomplished with land art inspired structures discussed further in Section IV. The sediment would deposit in the north basin and this pond bottom would a sand bottom

designed to be periodically cleaned out. This would also function as an infiltration basin depending on the amount of fines allowed to accumulate.

Discharge is limited to 5 cfs and is conveyed to Calle de Blas in a storm drain pipe. The time to drain is approximately 24-36 hours. The emergency spillway is located at the southeast corner of the south pond and discharges to the historic flow path.

The conceptual cost for the drainage component of the Dual Pond option is estimated to be approximately \$800,000.

Cross sections of the two Pond layout options are shown on Figure 10.

#### 4. Lower Salce Basin Collection and Detention System

Runoff from the area east of Calle Blanca, combined with the discharge from the Salce Park Pond(s), is assumed to be limited to 5 cfs for discharge to Loma Larga or the Corrales Main Canal. This constraint is based on previous discharge permits allowed by the MRGCD. Note that this assumed discharge rate does not currently have a permit or license.

Collection of runoff from this basin, detention in ponds to reduce the discharge rate, storm drain piping and ancillary facilities are required to restrict the runoff from this area. Approximately 3 to 5 acres of detention pond area will be required, depending on the pond configuration and location within the basin. Available undeveloped properties are limited; property acquisition may be expensive and should be one of the initial implementation actions if the PARK WITH POND(S) Drainage Option is pursued.

The conceptual cost for the drainage components, including land, for the Lower Salce Basin is estimated to be approximately \$3,100,000.

#### 5. Summary

The costs for all the Drainage Infrastructure components are summarize in Table 1 below:

Table 1 – PARK WITH POND(S) Drainage Infrastructure Cost Summary

System Component	Cost
Upper Salce Basin Collection	\$1,000,000
Calle Blanca Diversion Collection	\$700,000
Salce Park Detention Pond (Single or Dual)	\$800,000
Lower Salce Basin Collection/Detention System	\$3,100,000
<b>TOTAL COST=</b>	<b>\$5,600,000</b>

#### IV. LAND ART AS FLOOD CONTROL

The Salce Park Concept and Drainage Plan integrates several elements to improve quality of life and add community value as described in the SSCAFCA Quality of Life Plan (RD #9). In addition to the park development components described in Section II, land art concepts are integrated into the flood control functions.

### A. ART AS FLOOD CONTROL - THE CONCEPT (FIGURE 11)

The intent with the Salce Park Plan is to take the multiple use and SSCAFCA Watershed Park concept to the “next generation”. The objective is to increase community value by incorporating artist designs into the functional flood control facilities. To accomplish this, an artist joined the project team to provide concepts and ideas from a fresh perspective. This is intended to be an extension or upgrade of previous multiple uses integrated into flood control projects such as using access ramps as trails, playing fields as detention basins, the “rock garden” energy dissipater at Sunset Pond, naturalistic stabilization, educational signage, open space, etc.

The intent is to integrate artistic concepts and artworks into the flood control, water quality, habitat restoration and recreational functions of the facilities without significantly increasing the cost, thereby increasing overall community value.

## B. ARTIST

Representatives from “THE LAND/an art site, Inc.” and the Contemporary Art Society aided in the selection of an appropriate environmental/land artist. Paula Castillo, an artist with local, national and international art projects joined the project team and provided concepts and guidance and interpretive art components that are integrated into the overall concept. Data regarding Ms. Castillo and the Salce Park art concept development are included in Appendix F.

### C. SALCE PARK LAND ART CONCEPT

The Land Art concept for energy dissipation as part of the PARK WITH POND(S) Drainage Option is shown on Figure 11. The sculptural elements function as energy dissipation for the inflows from the storm drains slowing the water and controlling erosion. These sculptures are in lieu of a more traditional concrete energy dissipation structure such as an impact basin or hydraulic jump basin. The material for the sculptural elements could be steel, concrete or other long lasting materials. It is intended that the artist will be included in the design of the facility and artistic determinations finalized at that time. Based on conceptual cost elements, this energy dissipation structure should not significantly increase cost.



### *Interpretive Signage*

Incorporation of these structural elements in the park facilities and other structures at Salce Park would be determined at the time of design. Also, local ponds for the park could include these land art concepts on a smaller scale.

Interpretive signage presenting educational messages to encourage “ownership” of drainage facilities was also developed for use at Salce Park and SSCAFCA facilities.

## **V. SUMMARY & IMPLEMENTATION**

Several actions are required to implement any of the options presented in this report including political, funding, property acquisition, design, permitting and construction. The PARK WITHOUT POND option is clearly less costly and could be implemented much sooner than the PARK WITH POND(S) option, but involves innovative administrative actions to implement. Due to the savings of public funds, the PARK WITH POND(S) option is recommended.

1. *SSCAFCA and the Village of Corrales*. Accept the report.
2. *Village of Corrales*. Select and implement the Drainage Concept, either PARK WITHOUT POND or PARK WITH POND(S) as outlined below:

### **A. PARK WITHOUT POND – On-Lot Retention Required**

- 100% participation within the drainage area.
- Implement administrative, verification and reporting procedures to verify runoff is retained. One concept would be to establish a “Salce Basin Drainage District” with procedures to promote, implement and verify on-lot retention using low impact development principles.
  - On-lot ponds – Estimated \$5,000 per lot to construct.
  - Estimated Verification and Administration cost – Estimated \$500 per lot annual cost (approximately \$90,000 per year for the Salce area)
- Develop legal and administrative procedures to ensure ponds are installed on vacant properties and on properties developed prior to the 1989 Village of Corrales Ordinance.
- Design and construct Salce Park improvements, including on-lot ponds. Estimated cost \$700,000.
- Ensure roads have adequate road ponds.

### **B. PARK WITH POND(S) – Drainage Infrastructure Required**

- Implement starting at the outfall to the Corrales Main Canal
- Total estimated cost for drainage improvements, including property is \$5,600,000
- Total estimated cost for Park Amenities is \$700,000.



- Pursue funding. If property assessments were used to fund the public drainage infrastructure (not including the park), the total estimated cost is \$25,000 to \$30,000 per acre.
- Acquire properties in the Lower Salce Basin, \$700,000,
- Pursue MRGCD permit(s),
- Design and construct local ponds in the Lower Salce Basin including “art as flood control” components. Estimated cost \$1,200,000 without property.
- Design and construct collection, paving and conveyance facilities in the Lower Salce Basin (east of Calle Blanca) to deliver local runoff to and from the detention ponds. Estimated cost \$1,200,000.
- Select either the single pond or dual pond drainage configuration.
- Design and construct detention pond components at Salce Park including “art as flood control” components. Estimated cost \$800,000.
- Design and construct collection and conveyance paving and storm drain system in Upper Salce Basin. Estimated cost \$1,000,000.
- Design and construct local collection and conveyance paving and storm drain system in Calle Blanca Diversion Basin. Estimated cost \$700,000.
- Design and construct Salce Park improvements. Estimated cost \$700,000.
- Potential Phase IA – An initial phase to construct a \$400,000 “starter” system has been suggested. Phase IA would consist of the outfall from the Salce Pond with discharge onto Calle de Blas, including limited excavation at the pond, the outlet structure and storm drain piping to Calle de Blas. Conveyance would discharge onto Calle de Blas, a street without a stabilized conveyance, so erosion would be anticipated. This system diverts the runoff from the historic path.