

Mission Santa Inés Aqueduct Mapping Dynamic GIS, History and Technology 2003/04 Santa Ynez Valley Union High School

The Project

In September of 2003, the Environmental and Spatial Technologies class (EAST) at Santa Ynez Valley Union High School, under Dr Fred Van Leuven Superintendent, Norm Clevenger Principal, Chip Fenenga and Kim Merz, teachers, was contacted by Mr. Mike Loehr, who documented and helped represent Mission Santa Inés when it was approved for National Historic Landmark District status in 1998. He asked the class about the ability to map the water system using GPS and GIS technologies. This had never been done before and was a challenge as development is increasingly reaching out into the area. What made this project potentially unique were the following issues:

- The 200th anniversary of the Mission in September of 2004.
- The first industrial plant on the West Coast built by Joseph Chapman in 1821 - 1822. This could change the history texts.
- The Mission Santa Inés was the first college in California.
- An opportunity to work with professional archaeologists, local Native American Chumash Indian leaders, University professors and various community groups.
- The opportunity to present this work to the community in lecture forums and work with plans to preserve this historic treasure.
- The opportunity to publish the work and develop materials for use in local schools.

The high school students began by researching all that was known about this mission through their archives, databases, other libraries and particularly Mr. Bill Warwick, the 30 year historian and curator at the Mission. The student teams then used Trimble GPS units to map known aqueduct sites. Most of these known sites were rediscovered in 1980 when homes and access roads were built on Old Mission Road and Alamo Pintado Road. Not surprisingly, all sites had an elevation about 490 feet above sea level. GIS expert team student leaders then began to extrapolate where the sites could be using GIS technologies and USGS topographic maps back in our classroom.

They discovered a previously unknown site on the Richman property and also found where the aqueduct crosses Alamo Pintado Road. This aqueduct was installed underground to supply water and even early Mission writings mention this. Students then sent pictures, phoned and e-mailed expert archaeologists like Mike Imwalle of the Santa Barbara Trust for Historic Preservation and Dr. Robert Hoover of Cal Poly San Luis

Obispo. They came out and confirmed the sites. The students continued to map and inventory historic sites like the Chapman fulling mill and grist mill as well as the Zanja Cota Ditch, (used for irrigation and water to the mill complex).

Through these professionals, as well as local architects like Sid Goldstein, milling author and expert Jeremy Hass, University of California Santa Barbara professors in history, geology and ecology, the teams began to gather reports and data. These were all checked and added to their work. One intriguing mention of an old Spanish dam began to emerge in stories from early Danish Santa Ynez Valley residents, their research and eventually hard data.

The biggest problem was all the development that occurred on or near Alamo Pintado Creek. All individuals feel this was the source of water for the Mission. It runs year round, is listed in old Spanish documents about the Mission and is the site of Chumash and later Californian towns. The use of Zanja Cota ditch for water to drive the water wheels did not make sense as this was a seasonal earthen ditch. There was also a section of this ditch that proceeded northeast from the mill along a 450 to 470 foot contour toward Alamo Pintado Creek. This was intriguing to us.

We obtained a 1905 topographic map from Santa Barbara Trust for Historic Preservation archaeologist Mike Imwalle. This showed the area before development. The 500 foot contour line, where the aqueduct is found, did in 1905, cross Alamo Pintado Creek at a location where a dam could have been placed. This would have allowed water to flow to both the Mission using the underground aqueduct, and the mill complex.

At the mill complex, water can either be used to drive the water wheels or stored in large reservoirs. The fulling mill would have been used after sheering sheep (spring) and the grist mill would have been used for grain after harvest (summer). We do not get rain in the valley during those times to consistently use Zanja Cota (sometimes called the “Indian ditch”) to drive the wheels. But if water is diverted from Alamo Pintado Creek to fill the large reservoir, it can then be used for the grist mill. The water can then be drained into the fields below the mills for agriculture or put back into the creek for use at the tanning vats found further downstream. The mills and tanning vats were located away from the Mission because of smell, noise and rodent issues.

Despite some early setbacks, including the large 1812 earthquake, Mission Santa Inés was very successful. The large communities of Indian converts allowed for the development of vast herds of cattle, and the Mission successfully raised ample acreage of grains, fruits, and other produce. The Mission was virtually at the peak of its productivity in the early 19th century. An 1817 inventory of Mission Santa Inés listed possessions of 6,000 head of cattle, 5,000 sheep, 120 goats, 150 pigs, 120 pack mules, and 770 horses. In that year; Mission Santa Inés lands produced 4,160 bushels of wheat, 4,330 bushels of corn, and 300 bushels of beans. The Mission baptismal book in 1817 recorded 1,030 names, most of which were Indian. Also recorded were 287 marriages and 611 deaths. The Mission registered its greatest Indian population that same year, with a total of 920 Native Americans. They needed water to support that work.

Our Solutions

We then began to summarize the known water system and hypothesize what is missing and what could make it work. Based upon the archaeology data, historic research, topographic data, local experts and our own technology:

- We have placed a small dam on Alamo Pintado Creek at or slightly the above 500 foot contour elevation We have photographic evidence of a large section of the dam (or aqueduct) from the El Nino storm of 1998 washed down to the current bridge crossing at Hwy 246.
- We have followed the 1905 contours and this would allow access to water at both the Mission, the *lavanderia* (washing area) and mill complex.
- This also allows the water to reenter the creek for use at the tanning complex or in the fields.
- The water follows the 1905 contours and all evidence to date supports this route.
- The diversion of water makes sense regarding the location of the mission fields.
- The findings will be presented at The California Missions Foundation Conference in San Luis Obispo, Feb 13 – 15, at EAST in Sacramento March 8 – 10, in a lecture series at the Mission, and at the 200th anniversary of the Mission in Sept of 2004.
- All our work, models and data will become part of a paper to be presented to the Pacific Coast Archaeological Society Quarterly as well as archived at the Mission
- We continue to work with the Santa Barbara Trust for Historic Preservation developing animated models of the grist and fulling mills

The importance of the Mission is clear. Founded in 1804, Mission Santa Inés is one of the best preserved Spanish Missions in the United States, containing an unrivaled combination of landscape setting, original buildings, collections of art and interior furnishings, water related industrial structures and archaeological remains. In addition, the Chumash revolt of 1824, the largest and most successful revolt of Native American neophytes in the Spanish West began at Mission Santa Inés, making this site one of the most tangible symbols of resistance to European colonization in the United States. The 95 acre site contains the original adobe church and all its furnishings, an art collection rare in alta California, and most of the massive adobe *convento* buildings. The intact archaeological remains of two quadrangle wings, a portion of the *convento*, and the native American village are rare survivors and have been demonstrated by historical archaeologist Dr. Julia Costello, (Principal Investigator and Team Leader for National Historic District Landmark status), to contain the potential for exceptional information on the critical period of accommodation between native peoples and European colonial powers. The mission's agrarian setting is among the few historic mission landscapes that have survived to the present.

An Overview of the Mission Santa Inés

Throughout its 200-year history, Mission Santa Inés has overcome natural disasters, political turmoil, and financial hardships to emerge as one of the most successful of the

Southern California Missions. The Mission has endured rebellions, social upheaval, neglect, and decay only to rise again through restoration and repair as one of the hidden gems of the California Mission chain.

In order to serve the Chumash Indians in the Santa Ynez Valley area and to serve as a link between the Missions in Santa Barbara and Lompoc, the Mission was established in September 1804. While still in its formative years, the Mission was devastated by the great earthquake of 1812. The Mission continued to rebuild and repair, and actually became very prosperous during the first part of the 19th century, when the Indian population was at its greatest. The Mission acreage produced plentiful harvests, and its livestock numbered in the thousands. Mission Santa Inés also became linked to one of the earliest Anglo settlers in California, Joseph Chapman.

After Mexican independence from Spain, secularization caused the departure of the Spanish Missionaries and the Indian neophytes, which nearly wiped out the Mission. Despite the fact that the first college seminary in California was temporarily situated at Mission Santa Inés in 1844, it would have fallen into complete ruin were it not for the arrival of the Donahue family in 1882 and Father Alexander Buckler in 1904. Father Buckler began the repair of the Mission building and enlisted the talents of his niece to restore the art and artifacts. The Capuchin Franciscan Friars from Ireland, who followed them in 1924, continued their good works and efforts in this regard.

Today the process continues to restore, preserve, and return the "Mission of the Passes" to its former grandeur of the early Mission era. Mission Santa Inés is the proud and fortunate possessor of a rich collection of paintings, statuary, vestments, manuscripts, and artifacts. The Santa Inés Mission Museum houses a collection of vestments, artwork, documents, and artifacts that were used in and around the Mission throughout its history.

Reasons for Undertaking this Project

The project of mapping the water system at the Mission Santa Inés, meets the unique challenges of EAST; a project based service learning class using complex technologies. Students have used all technologies available to them including GIS, GPS, animation, video, CAD, graphics, and web tools. This project has had the 19 students (grade 9 – 12) meet various professionals, present to many groups, overcome problems and work as a team. What makes this project perhaps unique are the historical implications, variety of technologies and the depth of community service. Essentially, no one has ever mapped this system before. Dr Bob Hoover (distinguished Cal Poly archaeologist) has worked with Santa Ynez Valley Union High as well as numerous professionals. This will be the first mapping of a complicated system that has the following implications:

- 1) The students are writing a professional paper to be published in Pacific Archaeology Quarterly along with professional archaeologists.
- 2) The students have been invited to present their work Feb 4th in Solvang and Feb. 13 – 15th at San Luis Obispo in the California Missions Foundation Conference.

- 3) The students are presenting on the water systems at Mission Santa Inés in April as part of a professional lecture series.
- 4) The students have been invited to present all work, models and animations at the 200th anniversary in Sept at the Mission. Their work will be cataloged and become part of the museum's permanent archives under curator Bill Warwick.
- 5) The students work has prompted the Trust for Historic Preservation to mount a water wheel at the Grist Mill and involve us in a committee for planning for the site.
- 6) California history has the potential to be rewritten if scholars agree with the findings. In 1821 - 1822 Joseph Chapman built a fulling mill that could have used the system we have mapped. If this is true then that predates the first industrial application on the West Coast of the United States by 25 years. This pushes back the clock and would require a rewriting of history according to a UCSB Economic Professor Dr. Ken Harwood and UC archaeologists.
- 7) The publicity gathered by the students will help promote the work and potentially save areas for future studies.
- 8) All local 4th grade classes at 6 elementary schools will have a better understanding of the Mission system, the use of modern technology, and California Standards-based assessments. Field trips to the sites, video, dioramas and powerpoints will be given to those schools.

A quick few words about EAST. You can visit their site at www.eastproject.org for more information. The students had not the software or hardware before this project began. They ran into constant technical issues but were able to work together to try to solve these issues. The initial goals of the project were to apply technology to attempt to solve a "real world" problem. All the students used each other and other teachers as resources.

Historical background

While mapping the known Mission Santa Inés aqueduct sites, students in the Environmental and Spatial Technologies (EAST) class at Santa Ynez Valley Union High School a discovery was made of a new, previously unknown section of the underground covered aqueduct. This was found as students noticed that all of the known sites followed the 490 – 500 foot above sea level elevation contour. These known sites came from the June 1980 study for the Santa Barbara Department of Transportation by authors McIntyre and Burkenroad of Greenwood Associates regarding widening Alamo Pintado Road, conversations with local architect Sid Goldstein and the September 1980 building permits for homes along Old Mission Road.

This buried section was discovered due to erosion that occurred causing a small arroyo to form. Pieces of the aqueduct were being washed down to the street. This site was identified by expert archaeologist Dr. Robert Hoover of Cal Poly San Luis Obispo as part of an aqueduct system. Students also discovered where the aqueduct crosses Alamo Pintado Road based upon rock, mortar fragments and tile. All these site are on the 490 - 500 foot contour. Students also discovered fragmentary evidence, river rocks, mortar and

other debris caused by erosion at the base of this parcel of land. This property is currently owned by Martha Richman, (SB County parcel 139-030-66).

Back in the EAST classroom, students Tim Manchester, Erin Gnekow and Clay Garland assisted by Erik Glendinning used Arcview 3.3 to draw a buffer delineating the 500 foot contour line overlaid onto current USGS topographic maps. 3 – D maps were also created. Students had to reproject the data into Teale – Albers and add plotted GPS aqueduct sites using Trimble Geoexplorer 3 units and projected data. Students Jason Lambert, Erica Valdes and Tyler Eubanks photographed the sites and used imaging software to catalog the sites and artifacts.

Using this data and extrapolating about a possible route based on elevation showed that all known sites fell on this route. We all went out and dug a small trench and did find the aqueduct where we predicted it would be! Students were working at this time on the portion west of Alamo Pintado Road. The students, guided by teachers Chip Fenenga and Kim Merz also began to collect reference information including various journals, texts, photos, etchings and interviews. One that everyone relied on greatly was the McIntyre, 1980 report.

It bothered everyone that this 500 foot contour line, where the aqueduct ran, did not come near the only known source of water, Alamo Pintado Creek, until far upstream where no aqueduct features had been found. Great development had occurred on the eastern portion of Alamo Pintado Road including both residential (Creekside housing development in the 1960's) and commercial building (hospital and offices). To solve this, the class obtained a copy of a 1905 USGS topographic map from archaeologist. Mike Imwalle. This showed that almost 5100 feet northeast from the Mission; the 500 foot contour line ran through Alamo Pintado Creek. This was important because these numbers and this location matched the 1980 report and evidence cited in that piece. The area has since been graded and heavily developed so that the newest USGS map shows a different profile in that specific area.

Known Facts

Using the 1905 data and existing features, along with GIS technologies, the mapping began to fall into place to support the ideas written in McIntyre 1980. Certain facts must first be highlighted:

1. Mission Santa Inés did have an extensive water system noted by many observers including Baer 1950:99,105; Brewer 1930: 77; Engelhardt 1932: 37; James 1905: 266; Newcomb 1925: 231 Powell 1931:214; Walsh 1933: 33; Webb 1952; 81 – 83. This system included a brick and mortar reservoir in front of the mission, which supplied water for washing and drinking, for irrigation and orchards, for an early grist mill, fulling

mill and the tanning vats (currently under a golf course). It also supplied an Indian *lavanderia* (wash basin) which was located just to the south and connected to the main reservoir by underground pipes.

2. A ditch leading water from Zanja Cota Creek, located east of the Mission, to the floodplain below the Mission was first used for irrigation purposes and after 1820 (Uria, 1820) for operation of the grist mill. The reservoir, *lavanderia*, fulling and grist mill are all still standing.

3. Barring the use of water lifts (there is no evidence), water from the Zanja Cota ditch could not have been used to fill the Mission reservoir as it is 40 feet above the floodplain of the Santa Ynez River. This means that the water had to come from drainages to the north. It is unlikely that the Santa Ynez River was a source due to elevation data.

4. There was a dam on Alamo Pintado Creek and analysis of the mortar showed that it could have come from the early 19th century. While the tests can not prove it came from that time, there is nothing in the analysis (x-ray diffraction and microscopy) that rules this out. In fact, a known sample from the dam at Mission San Diego showed “very similar results” to the submitted sample from Alamo Pintado Creek.

5. GPS, photographic and archaeological samples show today where an aqueduct is found.

Evidence for an Alamo Pintado Dam and Aqueduct System:

Historical evidence documents that water for Mission Santa Inés was obtained from drainages to the northeast of the Mission mesa, including Alamo Pintado Creek. There is good evidence of the existence of a dam on Alamo Pintado Creek that may date to the Mission period. This dam could have fed water to both the Mission and the Mill complex based on elevation data. The reported finds of aqueducts, tile, mortar and river stones, lying between Alamo Pintado Creek and Mission Santa Ines, suggest that water was being diverted out of the Alamo Pintado Creek from somewhere near the dam for use at the Mission.

1. We believe that this is part of the Mission Santa Inés water conveyance system which seems to follow Old Mission Road to the Mission mesa along the 500 - 490 foot contour line.

2. We believe that a dam was constructed on Alamo Pintado Creek to supply water to an aqueduct directed to the Mission.

3. We believe this same location allowed water to follow elevation contours and supply the mill complex.

4. We believe that the Zanja Cota ditch supplied water only during large storms when runoff would fill the reservoirs. This was a secondary line that was going to be used to help irrigate the fields south of the ditch and north of the Santa Ynez River.

Evidence for our Hypothesis:

A decade before the establishment of the Mission, the area surrounding the Chumash village of *Alajulapu* had been inspected for suitability as a mission location and in fact, maize had grown in the floodplain of Santa Ynez, (Ortega 1795; Tapis 1798). The report by Goycochea (1798) made it clear that the Zanja Cota water would only “be conveyed to the base of the establishment.” The report by Tapis (1798) refers to 5 creeks near *Alajulapu*, with enough water for two irrigation canals. He notes that “the Mission will always have dependable water from the creek that flows past *Alajulapu*, at first for consumption at the mission, later for the garden and for the growing period of some corn.” Cota (1798) reports that besides Zanja Cota, there is another creek that would provide enough water for domestic use and a small orchard. A later report by Garcia (1834) definitively establishes the Alamo Pintado Creek was the source of water for the mission. Garcia first mentions Zanja Cota Creek, which was “used for irrigating the plantings of wheat, barley, corn, etc.” in the Santa Ynez floodplain, (today found south of the mill complex. He continues, “But two leagues northward there is another *ojo* (creek or source) known as El Alamo Pintado. It has an abundance of water which is used for irrigating crops.” A *diseño* (map) of *Rancho San Carlos de Jonata* submitted by Joaquin Carrillo indicates a site marked as “*Aguaje de Sta Ynez*” in the southeastern corner of the rancho, just north of the Santa Ynez River. This could be a spring or Alamo Pintado.

The plat map of Mission Santa Ines (Terrell 1860) indicates the existence of a stone dam on Alamo Pintado Creek. It is most unlikely that this was constructed by Mexican or Anglo-American settlers in the period following secularization and the decline of the Missions. The Californios were notoriously poor irrigation farmers and the Anglo-American farmers apparently did not irrigate in the area until the drought of the 1890’s (Oliver 1893:34). This dam was undoubtedly built by the Franciscans and their Chumash laborers.

There is no doubt, then, that the Alamo Pintado Creek was a source of water for the Mission Santa Ines. The question is, how the water was conveyed out of the creek and to the Mission. There are a few indications in the historical record as to where the water was diverted out of the creek. According to Brewer (1930:77) in 1861:

“Long lines of water courses, sanchas or small aqueducts, some of them miles in length, laid in stone and cement, to supply the town and irrigate the fields, are now dry and broken.”

George Warton James (1905: 266 see also Walsh 1930: 32) reported that:

“The water supply was brought from the mountains several miles distant, flumed where necessary, and then conveyed under ground in cement pipes made and laid by the Indians under the direction of the Padres.”

The “Mission Dam”

On the 1860 plat map, (Terrell – Surveyor General’s Office), a stone dam is indicated on Alamo Pintado Creek. This is a logical diversion point for a ditch and/or aqueduct. It was located approximately 4,587 feet from the northeastern corner of the Mission. This location closely corresponds with portions of a dam, still visible in 1980 about 5,100 feet from the Mission. This dam is no longer visible but possible features have been photographed by the EAST class of Mr. Fenenga at Santa Ynez Valley Union High School. The El Nino storms of 1998 flooded the creek, causing massive changes. Pieces of the dam or aqueduct were photographed at that time. Some local residents have always referred to the dam as the “Mission Dam” (Brand 1980 personal comment). The cartographic evidence, samples, photographic evidence and comments make it clear that there was a dam on Alamo Pintado creek. It is probably not coincidental that students Tim Manchester, and Clay Garland using GPS and GIS have discovered that that location could provide water to the Mission and mill complex based on elevation. Samples of the existing dam and aqueduct’s mortar were submitted in 1980 (Hawkins: 1980 personal correspondence) for testing and analysis. Results came back that showed these could have come from the early 19th century and were “very similar” to known samples from the dam at Mission San Diego. Rife (1977:38) conjectures that the Alamo Pintado dam fed water into the grist mill to the south. We believe this was the case based on the need for running water to operate the grist and fulling mill wheels. These mills would have been most likely running in late spring and summer when water runoff and rain is minimal according to historic data. “In this large complex we have mills of two different purposes, two different style water wheels, two different power systems and two different cultures, Spanish and Yankee. We also have what can be called California's first industrial park,” noted expert Jeremy Hass.

One of the least visited but most impressive parts of Mission Santa Inés is the mill complex. The remains are large and well constructed. The main mill-house is two stories high and the two reservoirs that stretch behind it extend back over two hundred feet. The massive stone reservoir walls are beautifully constructed. Large piers on either side of the first reservoir assure it would survive even severe earthquakes. This smaller and deeper reservoir was constructed of cobbles and mortar with 5 supporting buttress and supplied water for the grist mill and its Spanish horizontal water wheel. This was operated by small volumes of water dropping at high velocity from the small reservoir and being directed onto the blades of the water wheel by a wooden flume. The goal was to use two millstones to grind the grain into flour.

The second reservoir was clearly used to store large volumes of water eventually destined for the grist mill. The west end of this reservoir formed an isosceles triangle from which the water could drop into the smaller deeper reservoir through a narrow channel that could have been easily controlled by a sluice gate. The second reservoir extended one hundred feet or more into the slope of the hill and required a high back wall to be built. Thus, when the water from the aqueduct spout entered, it must have fallen almost twenty feet to the floor with a dramatic curve and splash. This was no simple mill; it was as massive as any modern government project.

In order for the dam to have supplied water to the Mission and mills, a downward slope would be necessary. The reservoir at the Mission is located at an elevation of 478 feet above sea level. All drawings of the Mission show this reservoir in place and none show above ground ditches or channels leading into the reservoir. The possible dam site is currently between 475 and 501 feet. All known aqueduct sites are plotted at elevations that make this downward slope possible. When a profile is constructed, you can see this clearly. Please note that the aqueduct remaining is all underground and the GPS readings are all at surface elevations so the aqueduct is beneath those points. The EAST students did not have permission or expertise to excavate those sites. However, partial digging showed that the aqueduct runs 6 – 20 inches underground.

Other evidence – the findings of local residents as well as archaeologists – point to the existence of an aqueduct system on the northwest side of Alamo Pintado Creek. Carl Rassmussen (1980) who arrived in the area in 1911 at the age of 17, claims that the aqueduct followed Old Mission Road on the north side. Indeed, evidence found in construction of the Mission Oaks development and finds by the EAST class at Santa Ynez Valley Union High School support this comment.

Thyra Larsen (1980: personal comment) reports that her husband, John, who leased the land from the Janin's in the 1950's kept running into mortar and stone with a subsoiler in the corridor between Alamo Pintado Dam and Alamo Pintado Road. The Janin's spoke with Maime Abbott (1930) and she stated that the dam did supply the Mission with water. Mrs. Abbott lived at the Mission at the time. Dorothy Brand reported mortar remains and fragments when a sewer was put in. This is currently where the 1905 USGS 500 ft elevation contour line crossed Alamo Pintado Road toward Alamo Pintado Creek. Mr. Rassmussen also found remains of a covered burnt brick, underground channel in the shape of a trapezoid at a fork in Alamo Pintado Road. Finally two reports of the Mission Oaks access road development and widening of Alamo Pintado Road (McIntyre, 1980) confirm finding and excavating parts of the aqueduct. James (1911:266) states that for the Mission Santa Ines: "The water supply was flumed where necessary, and then conveyed underground in cement pipes made and laid by the Indians under the direction of the padres."

You might ask, why expend lots of energy, time and materials to cover the aqueduct? These were a common feature of mission water systems and used when needed. You would bury it if it needed to be below grade, in an area of heavy slope wash or to maintain or increase hydrostatic pressure. It appears that burying the aqueduct was necessary here because it needed to maintain a downward slope from the possible source at the dam on Alamo Pintado Creek. By being dug down 12' – 24" along slopes not heavily covered, significant erosion would have occurred during periods of heavy runoff.

It is possible that a ditch dug further up Alamo Pintado Creek could have supplied the water to the aqueduct. A 1938 aerial photo shows an intriguing line, which could have been the surface manifestation of a ditch leading out of Alamo Pintado Creek. Garcia's report of 1834 says that the Alamo Pintado *ojo* was "two leagues northward" of the Mission. This is further than the dam site.

Many of these features, aqueducts, ditches, reservoirs and the dam, were later used by Anglo-American farmers. According to Walsh (1930:32), “*zanjas*, or ditches, constructed by the padres and their Indians, are still in use among the farmers of the valley.” According to Nostrand (1964:72) the Alamo Pintado valley was not part of any Mexican land grant and was therefore public land available for homesteading. The first Anglo-American settlers were squatters, but beginning in 1860, the land was formally homesteaded. Deed records indicate that the land north of Hwy 246 and west of Alamo Pintado Creek (assessor’s Parcel No.139-300) was patented in 1871 by Thadeus Amat, former bishop of Monterey (Santa Barbara County 1881:590), and that Louis Janin came into its possession a decade later, (Santa Barbara County 1881:590).

The Alamo Pintado Creek, which to this day runs year round, provided enough water for dry farming, (Oliver Ca. 1893:14b). According to Mason (1883:302), irrigation in the area was “not necessary for field crops, except in seasons of excessive drought and is resorted to only for the garden of flowers.” According to nineteenth century local newspaper correspondent Fred D. Oliver, the source of all water was Alamo Pintado Creek or Ballard Creek. In his 1888 – 1894 report filed at the Santa Ynez Valley Historical Society Museum Library, Oliver (1893:30b) noted the existence of “an enormous spring” on the Janin property, but made no reference of irrigation in the immediate vicinity of the spring.

The spring on the Janin property indicates that potentially this may have also been a source of water for the reservoir. Indeed, some other Missions used springs as a source of water. The problem with this idea is the issue of elevation. Today all Janin property is found at a lower elevation than the Mission reservoir. Using the 1905 USGS topographic map also shows this area at a lower elevation before large commercial grading and development, (the hospital, Nielsen’s market and Creekside housing development), went in. The Janin’s did report the use of their property for cultivation of grapes (potentially the Mission’s old vineyards). This spring could also have been the “Aguaje de Sta. Ynes” indicated on the Carrillo *diseno* (map) of *Rancho San Carlos de Jonata*.

According to the developers of the Creekside housing complex (covering the area between Alamo Pintado Creek and Alamo Pintado Road), originally they intended for sunken living rooms but abandoned this when high groundwater seeped into model units. The hospital has consistently had a high water table and this is almost across the street from the original Janin home. Even today you can walk the hospital grounds and find Spanish mortar and lime fragments, river stones and ancient olive trees. Dr. Baranko commented that when the hospital was built, they had to pump water out for days. Walking near the hospital on a warm summer day, months after the last rain, you can today hear water running and see deep rooted trees in areas of a possible spring.

The aqueduct probably connected with the dam on Alamo Pintado Creek. The projected route was walked back to the Mission without further indications visible from the surface, although interviews with Rassmussen and others describes a Mission aqueduct south of Old Mission Road, in a graded field, and north of Old Mission Road, in an area of residences. This is where students have found evidence, mapped and added photographs.

The aqueduct appears to run along the bottom contour of the small knolls, taking advantage of the gravity flow down to the mission. But because of topography and gravity, it is impossible for the aqueduct to follow a straight line to the mission on the S39°W alignment. The flow almost certainly ended up in the 1808 reservoir in front of the church. The water in this reservoir was apparently for the padres' use, although physical inspection of the reservoir revealed that a pipe shown extending east from the reservoir in the plan of Mission Santa Inés (Newcomb 1925:231) actually ran off the mesa the church is on, down to the flat and was probably used for irrigation.

A second reservoir located near the Indian settlement more than 600 feet south of the first also drew water from the large reservoir. This was for washing. The plan for the Mission also shows a line running due north from the first reservoir. This is probably the inflow pipe by which the water from the aqueduct was conveyed into the Mission's internal system. This feeder or inflow pipe may have connected at the one feature typical of other mission water systems which is missing here – the water filtration tank. Such a structure is essential because it “served to clarify water for domestic purposes” (Webb 1952:73), and standing examples may be seen at Santa Barbara, La Purisima, and San Buenaventura Missions. Photographs, pictures and sketches of Santa Inés over time were examined to see if the filtration tank was located near the mission, but the results were negative. The structure may have been near or slightly north of Highway 246 which would intercept the projected route of the aqueduct. There is a 1980 report by McIntyre that suggests the site was found and then reburied.

It is possible that the aqueduct supplied water directly for irrigation of the fields in the flat, in which case it could run basically south and off the mesa without approaching the mission, but this is considered unlikely because of the amount of work invested in the construction and the existence of an outflow pipe to the flats from the first reservoir.

Juniors Marcos Veldanes, Jason Lambert and Erik Glendinning created scale models of the two topographic maps (1905 and 1984). These students along with Clay Garland hope to use all the work and combine it in a virtual reality field trip using sophisticated software. Junior Mikey Carlson using CAD programs constructed models of the fulling and grist mills. These were exported and animated by Ian Blumenthal, Peter Oliver and Nate Breen and we hope to have this available at the mill site for all to see. Erik Glendinning kept the server working throughout all of this so that all had access to their information. Jessie Gavlak, Breanna Schlags, and Erin Gnekow created presentations, conducted historical research, did interviews and are writing all this up. Erin was also responsible for many of the maps created. A 4th grade presentation is developed on the history of this Mission, by Breanna Schlags, as that is where the subject is covered in California State Social Science Standards. A web site with all information is being set up at www.syvpirates.org/east by Peter Oliver and Caleb Manchester. Students Erica Valdes, Adrian Evarts and Tyler Eubanks are responsible for much of the graphics. All Valley schools will receive copies of the student written booklet, video, diagrams and lessons developed. This booklet was written by Breanna Schlags. One exceptional collaboration is with the local Chumash reservation. Phil Hauck, our videographer, Emily Garland and Daniel Schley contacted 2 tribal elders to read a Chumash written poem on our video, as

their ancestors built this aqueduct. We would also like to have a section rebuilt at the Mission for all to see. The entire class was involved in this project and it has brought many different community individuals together.

Because the data concerning the aqueduct is missing and this segment had not previously been identified, the significance of any remaining element of that system is magnified as it represents that is left of that information. The integrity of the mission water system has suffered over the years due to development; where individuals identified potential locations of aqueduct features, housing tracts now stand. Therefore, it becomes more important that any remaining component of that system should be preserved.

We do not know how much of the system is still there. This can only be determined through subsurface assessment or the use of ground penetrating radar. The Aqueduct probably no longer exists under Alamo Pintado Road or Creekside housing development. The road cuts and housing have destroyed large sections of the aqueduct including Hwy 246.

The aqueduct is a historically significant structure. An accomplishment of this magnitude for the management of such an essential commodity helps to demonstrate the level of energy necessary for the construction and maintenance of the Mission water system. This can be illustrated by even the raw materials used; the river rocks hauled up from the Santa Ynez River; the lime, from a quarry on the south side of the Santa Ynez River near the present day sewage treatment plant. All the stones used for the base, sides and capping and chinking were carefully selected, transported and fitted into a trench, dug to maintain the necessary gradient. It was a tremendous accomplishment that was buried and forgotten by most..... until now.

Respectfully,

The 2003 / 2004 EAST class

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