The Neff Hacienda & Observatory
Cerrillos, New Mexico

da Silva Architecture Inc.

Portfolio

By

Raymond Gabriele
Architectural Designer
&
Project Manager

Exterior Passage, La Hacienda de Los Martinez

Table of Contents

Project Team

Project Team

da Silva Architecture Inc. .....Architect

J.M. Evans Construction.....General Contractor

Sonalysts.....M.E.P. Engineer

Positive Energy.....Photovoltaic Engineer

Cedar Mountain..... Hydronic Engineer

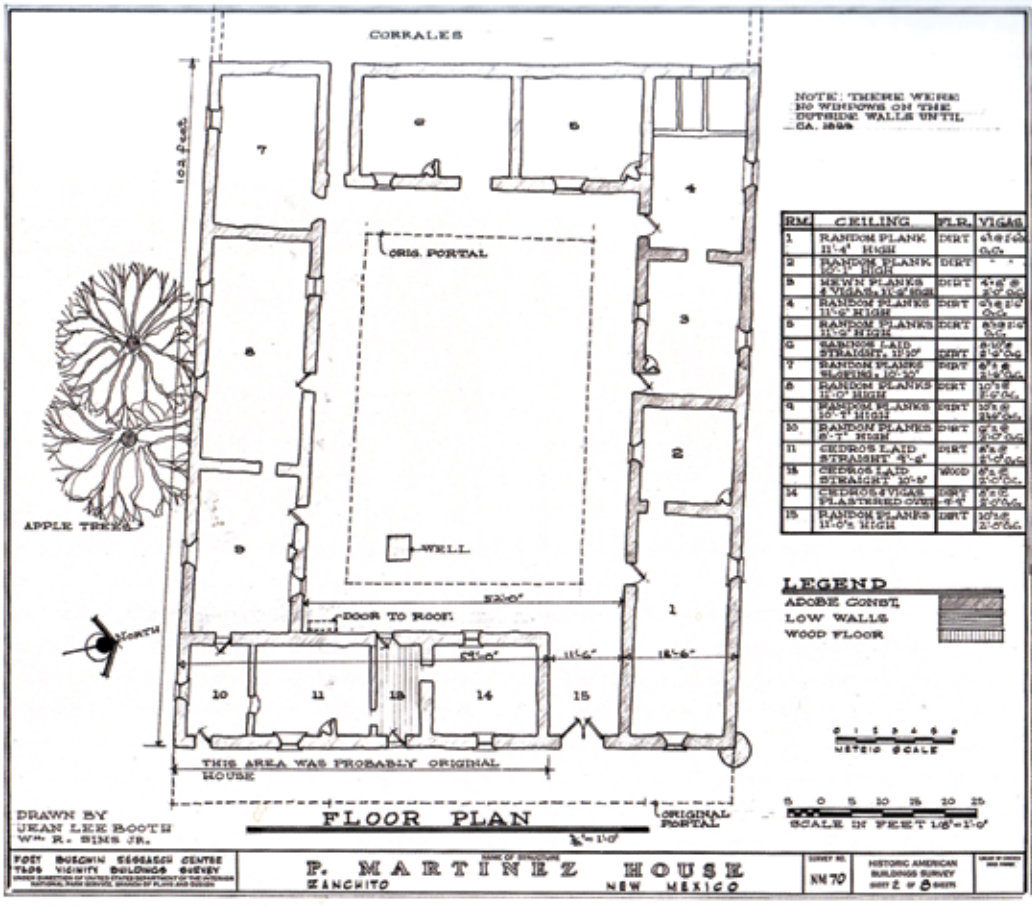
P.E. McGinnis Engineers..... Civil Engineer

Structural Design Associates..... Structural Engineer

Santa Fe Permaculture.....Landscape Designer

Earthworks Engineering Group Inc.....Geotechnical Engineer

Programming & Context



Above: Front corrale plan of Martinez Hacienda from *Recording a Vanishing Legacy* by The New Mexico Architectural Foundation

Programming

La Hacienda de los Martinez

The Neff Hacienda and Observatory evolved over the course of a two and a half year design collaboration that took as its typological model, the renowned Martinez Hacienda in Taos New Mexico.

Built in 1804 by Severino Martin (later changed to Martinez), this fortress-like building with its massive adobe walls became an important trade center for the northern boundary of the Spanish Empire. The Hacienda was the final terminus for the Camino Real which connected northern New Mexico to Mexico City, and remains one of the best preserved southwestern structures featuring some of the most iconic characteristics of Spanish Colonial architecture.

The cellular and sequential nature of the Hacienda's plan, accessible only through a central corrale, provided an unexpected and unique model for a Twenty-First century recreational hacienda, conference center and observatory.

Project Data

Address: Old Cash Ranch Road AB, Cerrillos NM
Gross Heated: 7,270 SF
Net Heated: 6,902 SF
Building Foot Print: 9,484 SF
Construction Type: Mud-Stucco, Pumice-crete, Concrete
Construction Budget: 4.8 million USD

The Neff Hacienda and Observatory developed over the course of two years from a modest and remote 1200sf observatory torreon into a 7000sf recreational hacienda, conference center and observatory, serviced by two integrated torreons and rooftop sanatorium. The design appropriates the Martinez Hacienda's most fundamental planometric principles into a stunningly unique Twenty-First century model of southwestern modernism. Designed around a large open-air courtyard, or "corrale," the plan is defined by two primary wings bridged by an indoor pool to the north. The east wing, housing the owner's office, conference rooms, and observatory control rooms also incorporates more domestic programs including a full, commercial kitchen and guest suite, while the building's west wing contains spa, exercise and pool facilities.

Top: Digital plan massing, developed observatory wing, preliminary spa wing
Middle: Digital plan massing, developed spa wing
Bottom: Developed digital massing model, with rocket pad.

Site & Building Context

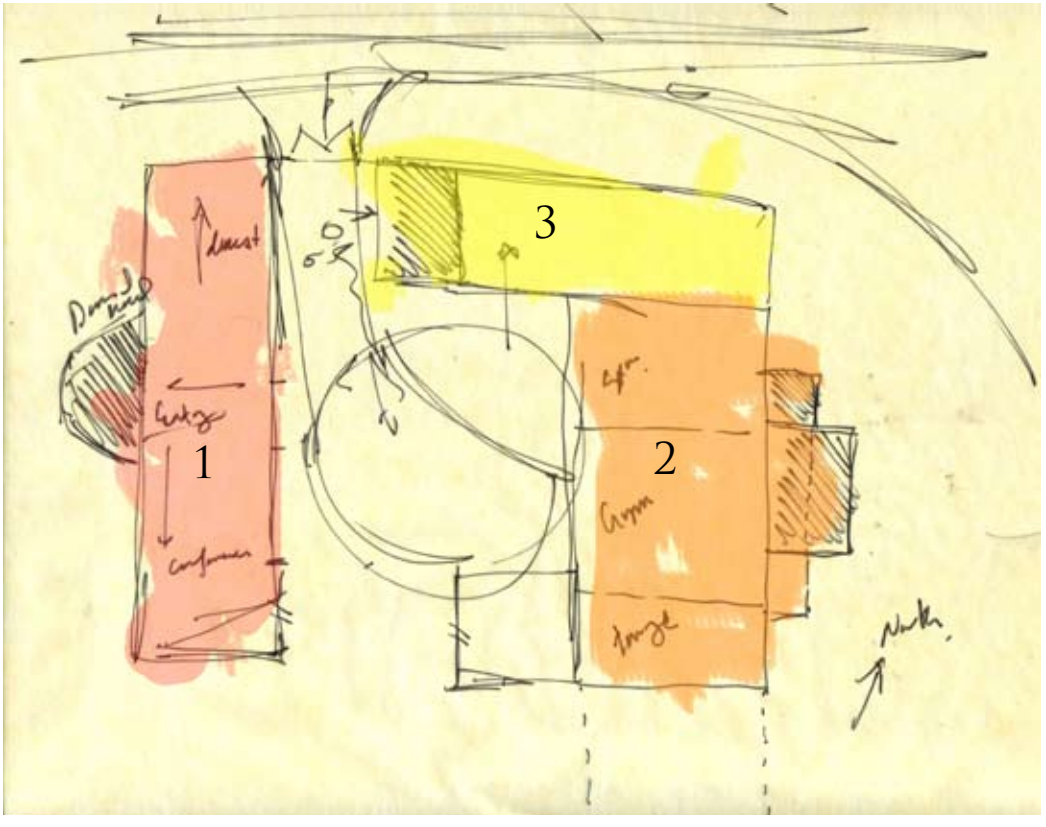
Sited on over 1,200 acres of ranch land in Cerrillos New Mexico, the Neff Hacienda and Observatory had to be both structurally and aesthetically sensitive to the site's vast and delicate desert landscape. With over 10,000 tons of pumice-crete, a 2,800 cu.ft indoor swimming pool and two custom engineered telescopes piered 30ft into the ground, the building's foundation plan had to be carefully considered in order to preserve proper calibration of astronomical equipment and prevent potential building displacement and pool leakage into the site's silty, clay soil.

The building utilized a great variety of site specific materials including the excavated soil, used to make the building's exterior mud stucco finish, as well as stone found on site near ancient Native American ruins, used extensively to form the building's exterior foundation veneer.

Right: On site Pueblo ruins

Below: Site Panorama

Schematic Design



Designating Abstract Program

Originally conceptualized as a modest and independent accessory structure adjacent to the owner's main house, the plan grew from a simple, rectangular adobe volume (building 1) designed as a private observatory intended to house the owner's astronomical equipment and private office, into two contending buildings later connected by a large indoor pool room (building 3). The second wing of the plan (building 2) was added a year after the original design for the observatory had been proposed, and is designed to accommodate recreational spa and gym facilities for the owner's friends and family.

Right: Early plan sketch of program phases.

Schematic Massing

After the original observatory wing had been located and programmed, additional program evolved in the form of an opposite wing building intended to enclose a landscaped courtyard adjacent to the main house's entrance. The later addition of an indoor pool room running perpendicularly between the two wings more fully enclosed the courtyard, turning it into corrale in which circulation and access to the three buildings was granted. Further development of the massing plan experimented with varying levels of enclosure and permeability between the corrale, road, and ranch property.

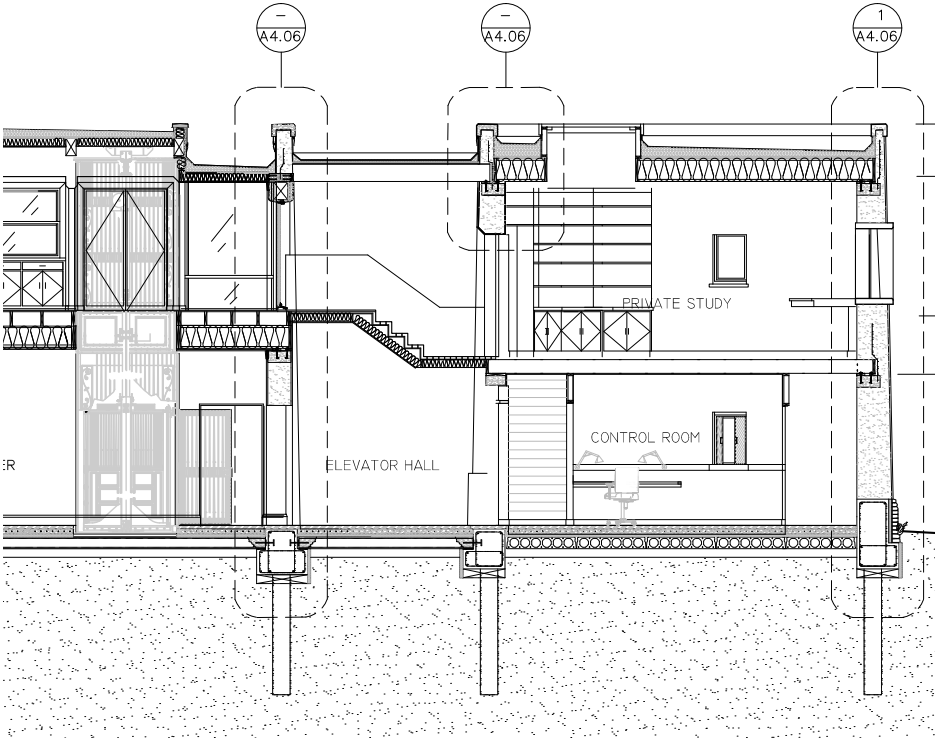
The West Torreon

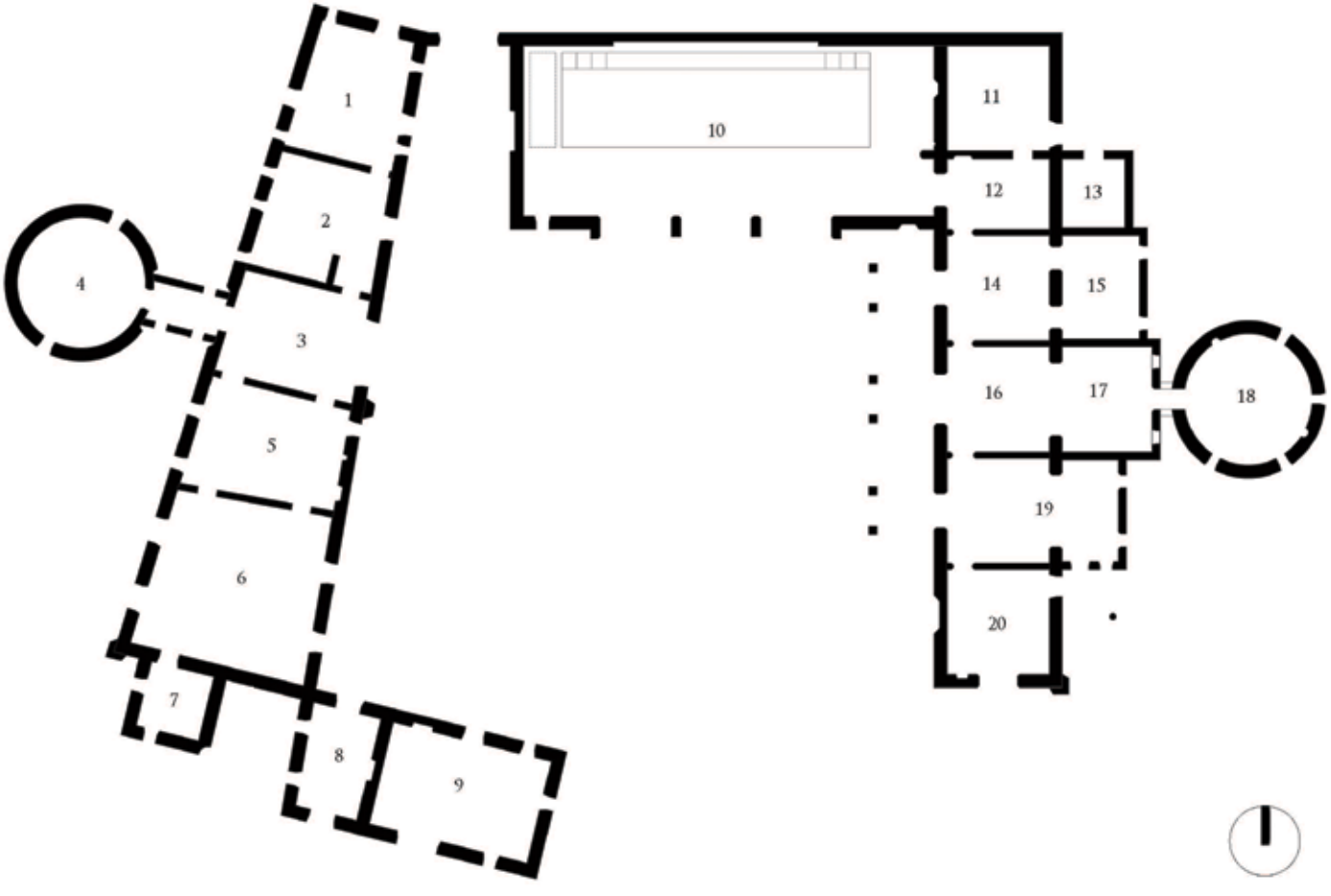
The observatory's original design was conceptualized in the form of a modest tapered torreon, or watch tower, designed to house a retractable 24in revolving telescope. As the owner's requirements grew, so too did the original 1200sf torreon. In order to accommodate a control room to house the owner's computer servers, a private office and a large conference and screening room, the torreon was incorporated into a larger structure and more complicated pumice structure. The observatory torreon later became re-programmed to accommodate only the server room and office, displacing the retractable telescope into another, ancillary building re-sited in the Cerrillos mountains. Thus the requirement to design a telescope mechanism as an independent 30ft deep siloed pier was alleviated, freeing the torreon to become fully occupiable.

Top: Early clay massing study, with open southern edge
Middle: Clay massing study with southern boundary
Bottom: Clay massing study with programmed southern boundary.

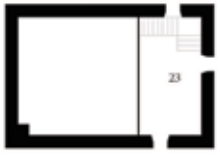
Opposite Left: Sketch of original observatory torreon with piered telescope.
Opposite Right: Re-designed torreon, housing office and control room


25'


A4.06
A4.06
A4.06
PRIVATE STUDY
CONTROL ROOM
ELEVATOR HALL



Ground Floor Parti



Plan Legend

1. Kitchen
2. Reception Room
3. Main Foyer
4. Control Room
5. Art Gallery
6. Conference Room
7. Conference Storage
8. Arched Passage
9. Guest Suite
10. Pool Room
11. Pool Equipment Rm
12. Utility Room
13. Pool Mech. Rm
14. Changing Rm Foyer
15. Changing Rooms
16. Hammam Foyer
17. Cold Plunge Rm
18. Hammam Massage Rm
19. Exercise Rm
20. Yoga Rm
21. Study
22. Santotorium
23. Guest Loft

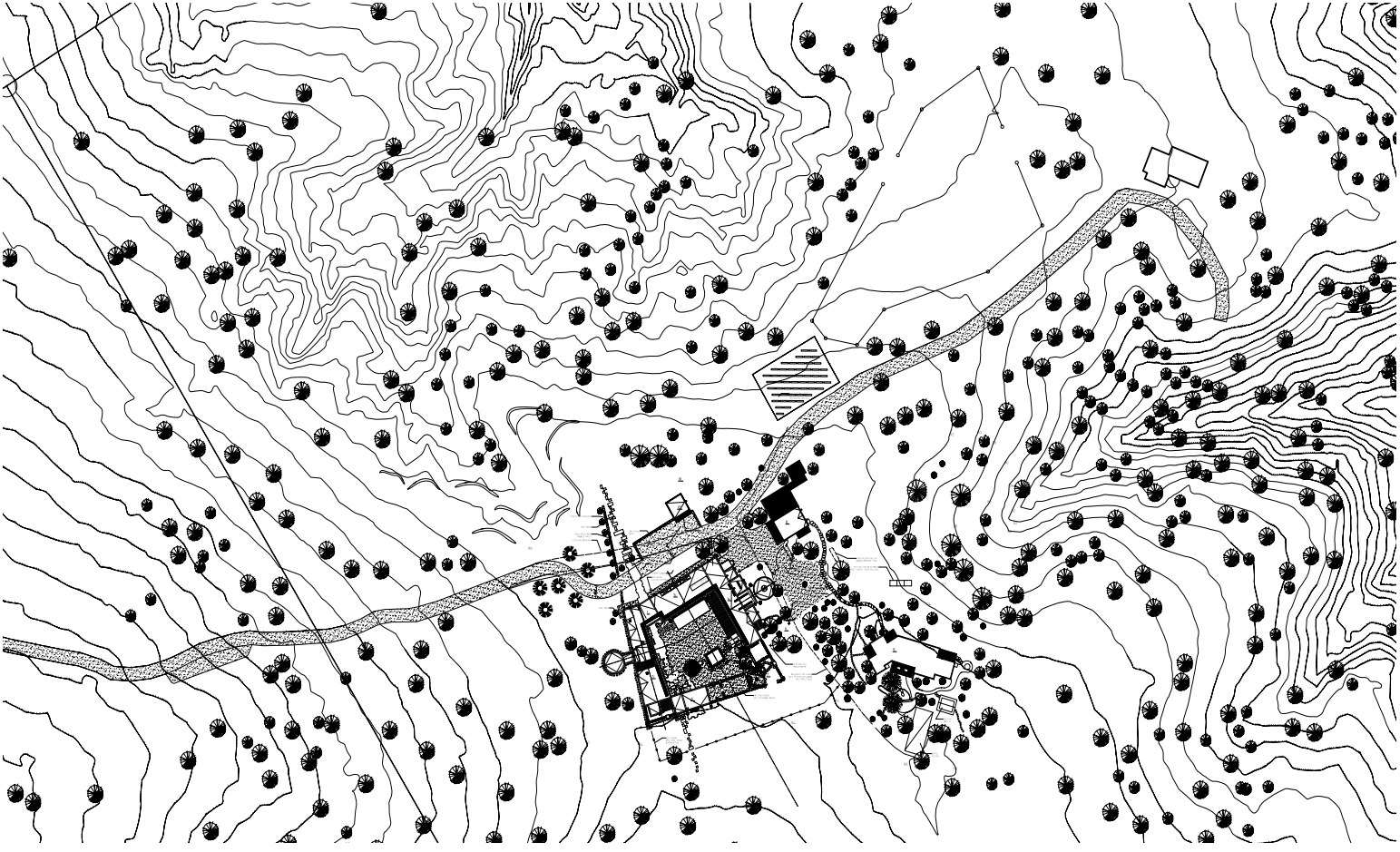
Second Floor Parti

Design Development

A Twenty-First Century Spanish Colonial Idiom

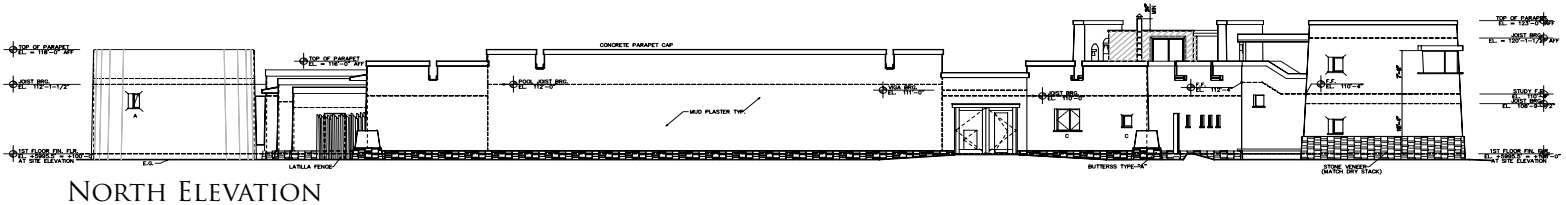
Both the planometric and aesthetic typologies of the Neff Hacienda and Observatory were derivative of the famed Martinez Hacienda in Taos New Mexico. The fortress like mien and cellular nature of the Martinez plan was unexpectedly conducive to accommodating the unique and varied programs of the Neff Hacienda and Observatory and the vast, austere character of the Hacienda's exterior faces was easily customizable to speak naturally with the dessert landscape and existing structures of the Cerrillos site.

Left: La Hacienda de Los Martinez, main entry



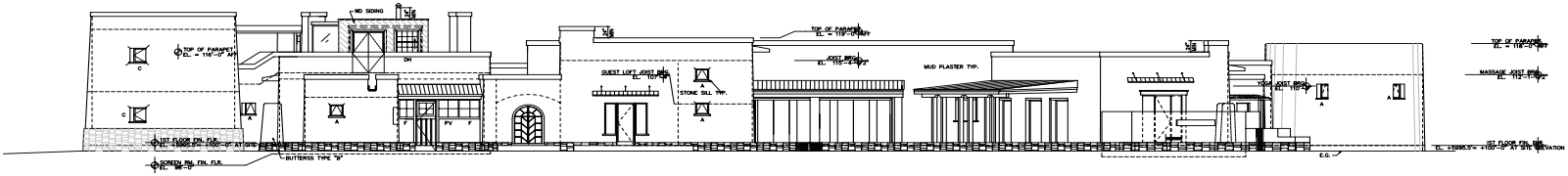
Final Schematic Site Plan

Rendered Site Plan



North Elevation

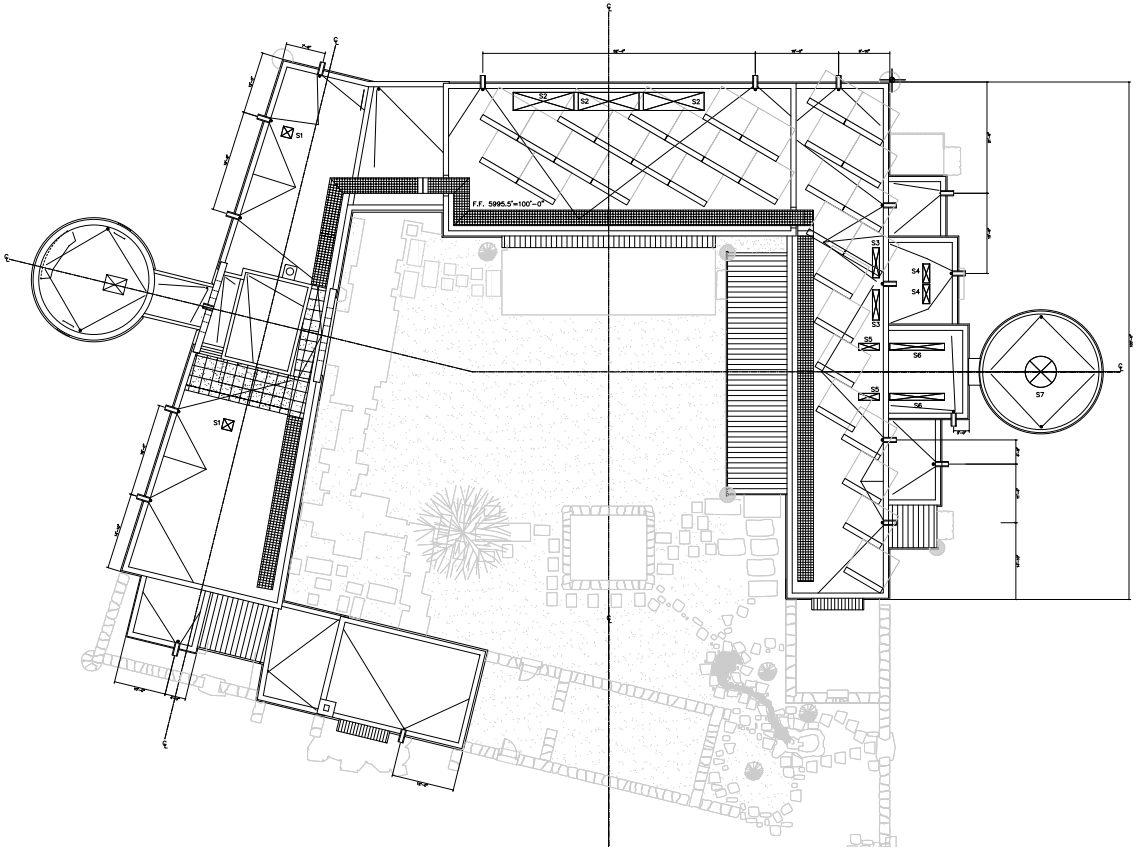
North-west Rendering



South Elevation

South-west Rendering

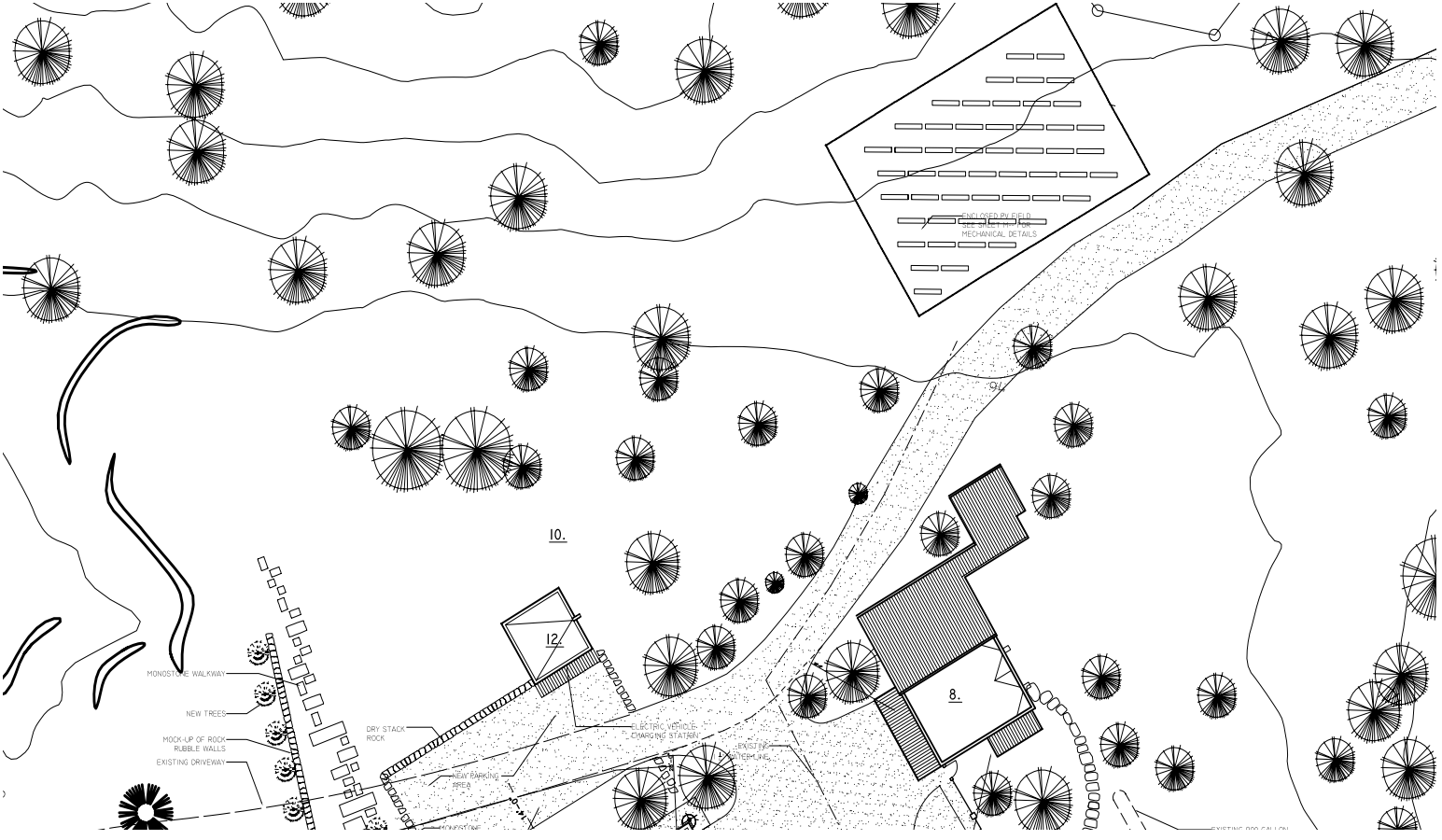
Sustainability



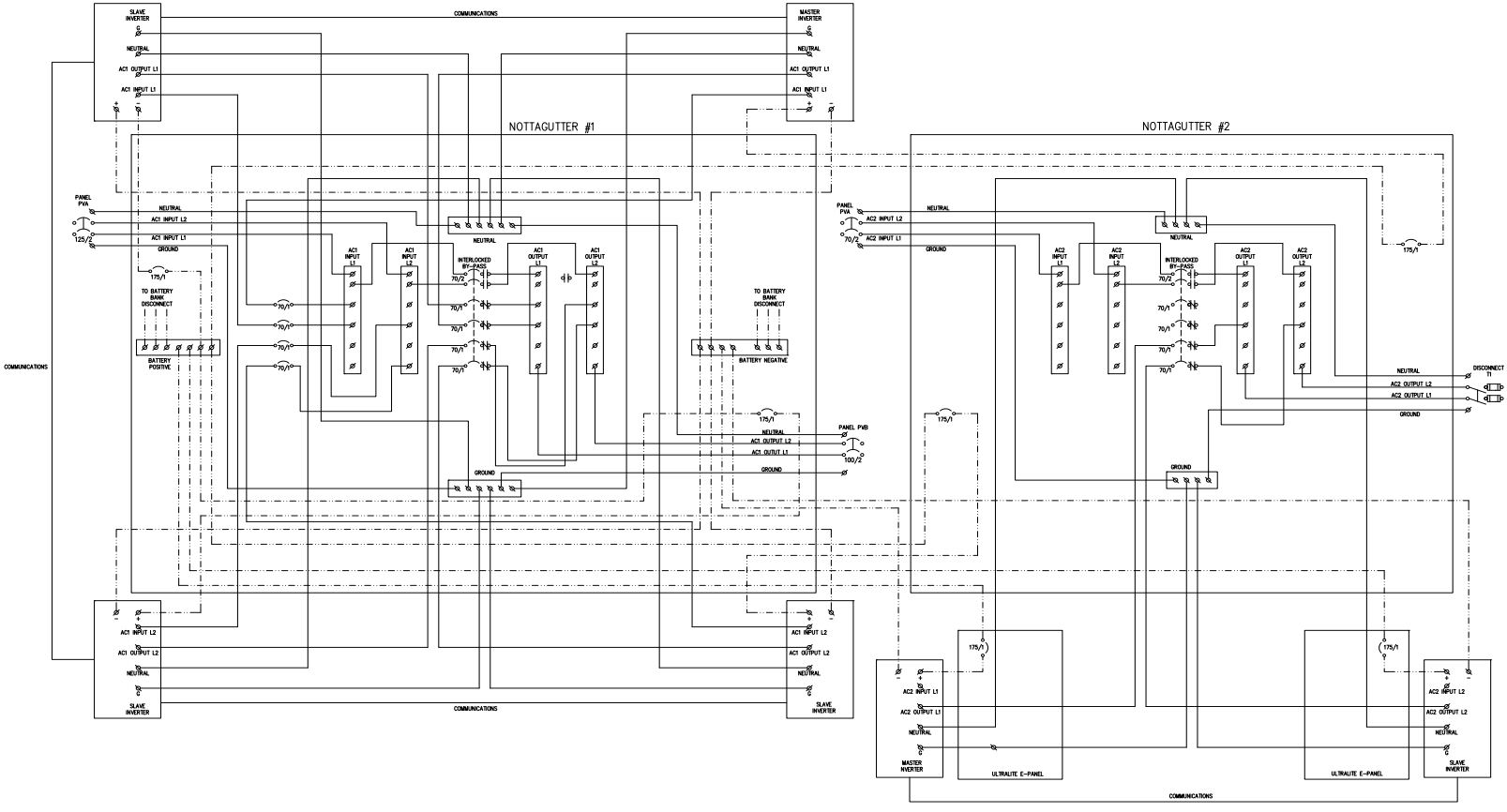
Above: Roof Plan showing location of hydronic array

Sustainability in the Desert Southwest

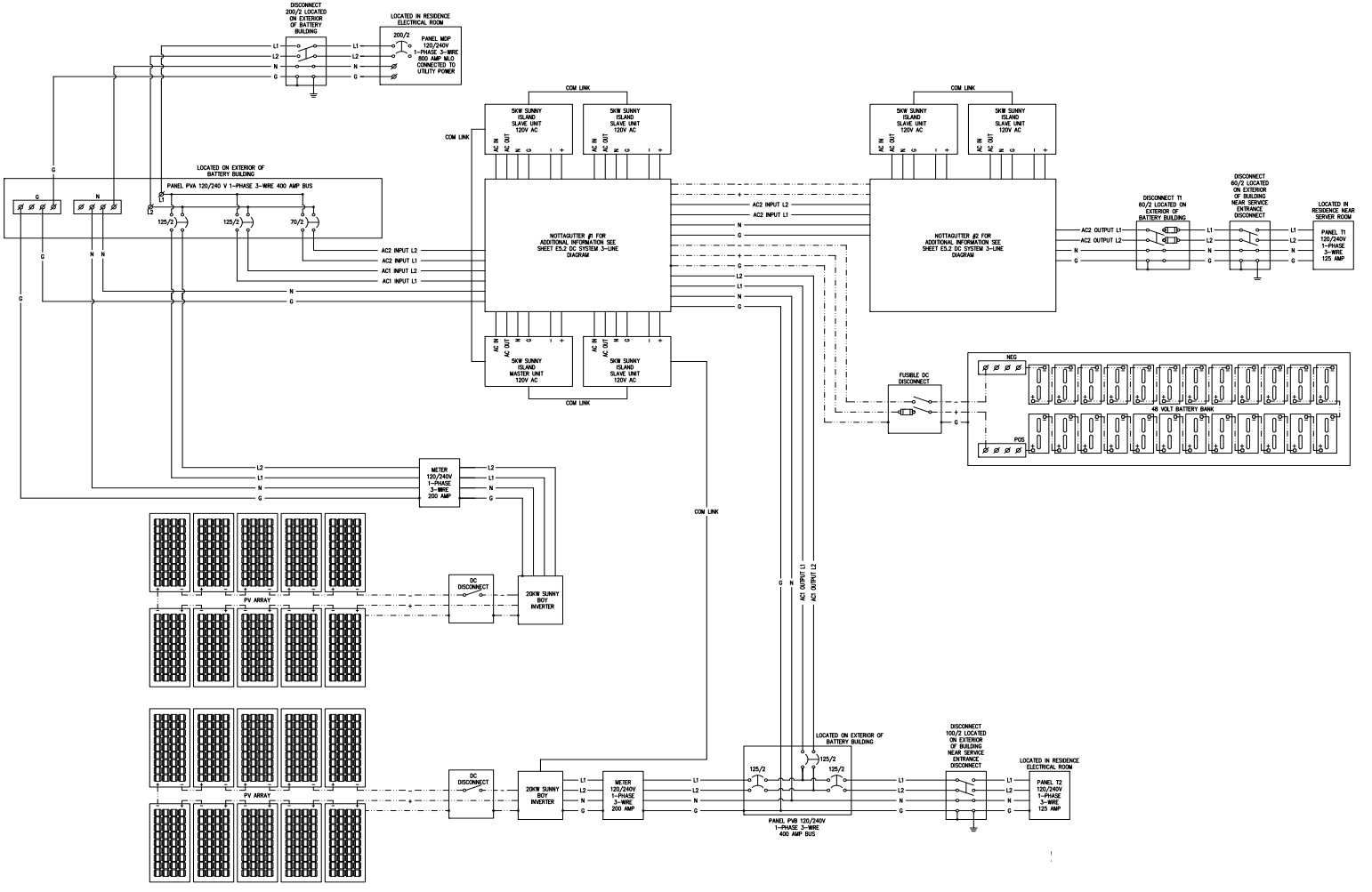
The extreme climatic variations of the region, combined with the delicate sandy clay earth of the site make sustainable planning and construction an unusual challenge, especially for a structure as large and as complicated as the Neff Hacienda and Observatory. Water scarcity and strict water regulation in the region requires new construction of this scale to supply 40% of its water itself, and the Neff Hacienda and Observatory is serviced by three 20,000 gallon, subterranean cisterns which are able to fully supply the new structure as well as the existing main and guest houses. A 33 unit array of solar-hydronic collectors is housed on the roof of the structure and hidden by the building's 3ft tall pumice parapet surround and is able to effectively condition and heat water for domestic use within the new structure as well as for the indoor pool. A heliotropic photovoltaic array to the north of the building produces enough energy to service both the new and existing structures while generating enough excess to allow the owner to sell an average of between 50 and 80 AMPS of electricity back to the county utility company.



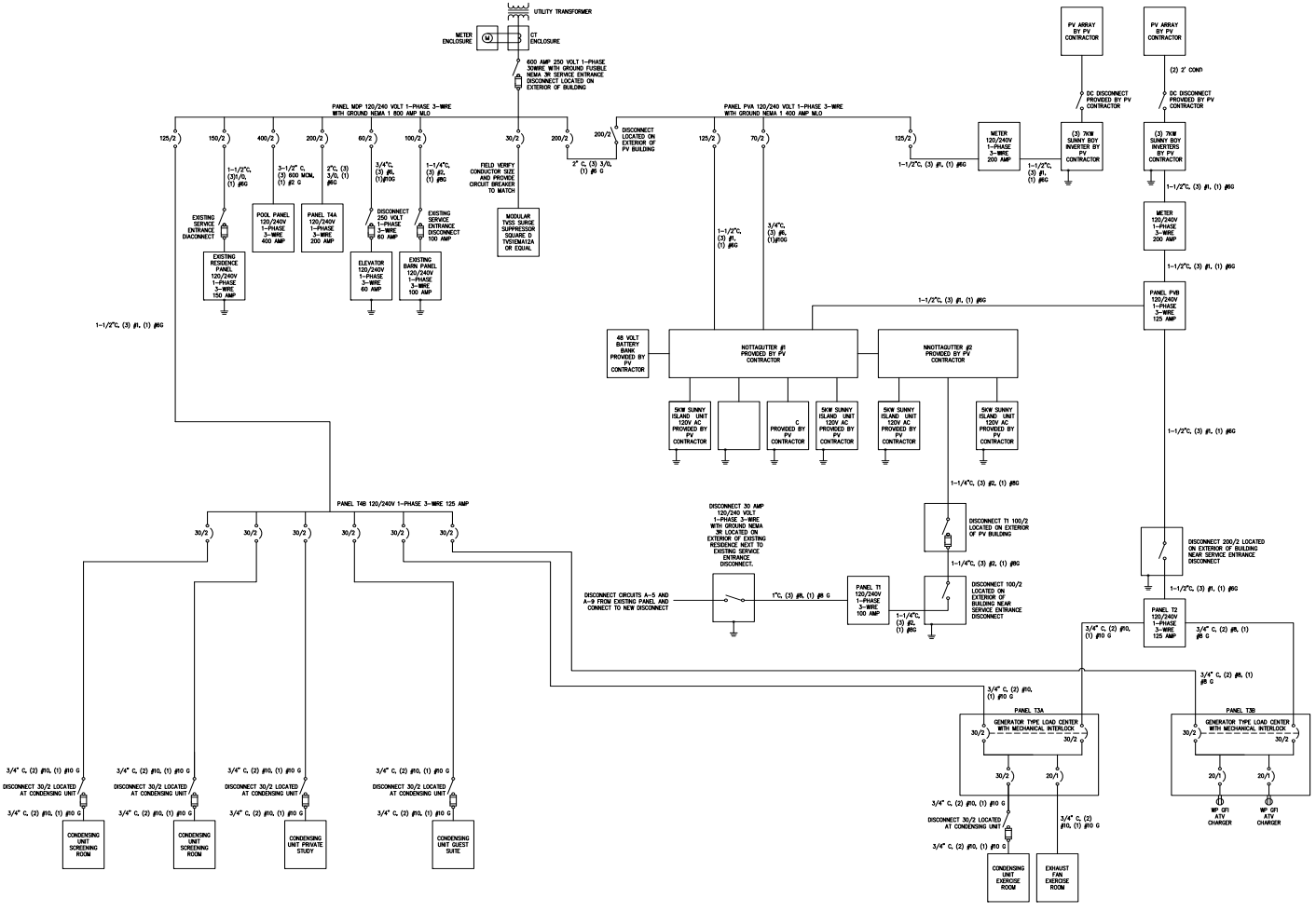
Site Plan showing Location of PV array
Existing Garage and battery storage shed



PV System DC, 3-Line Diagram

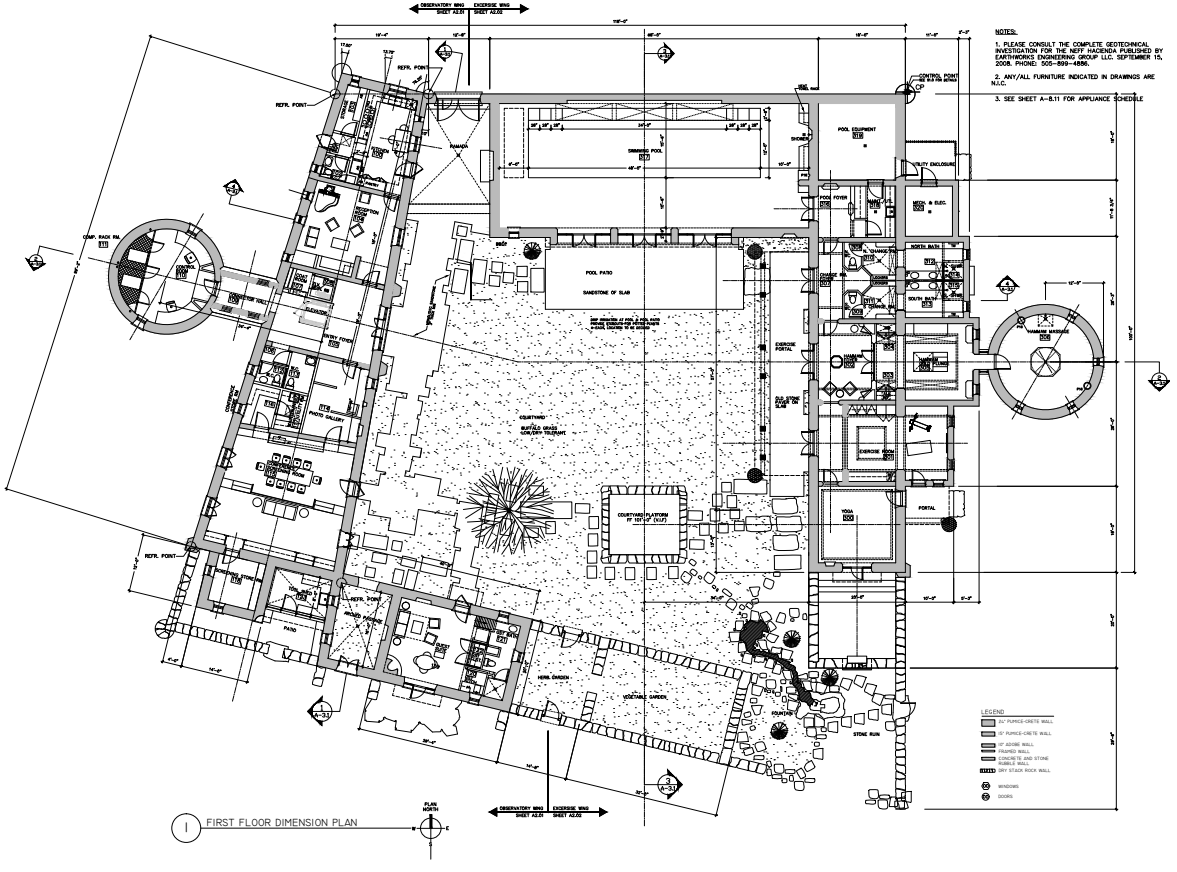


PV System AC, 3-Line Diagram



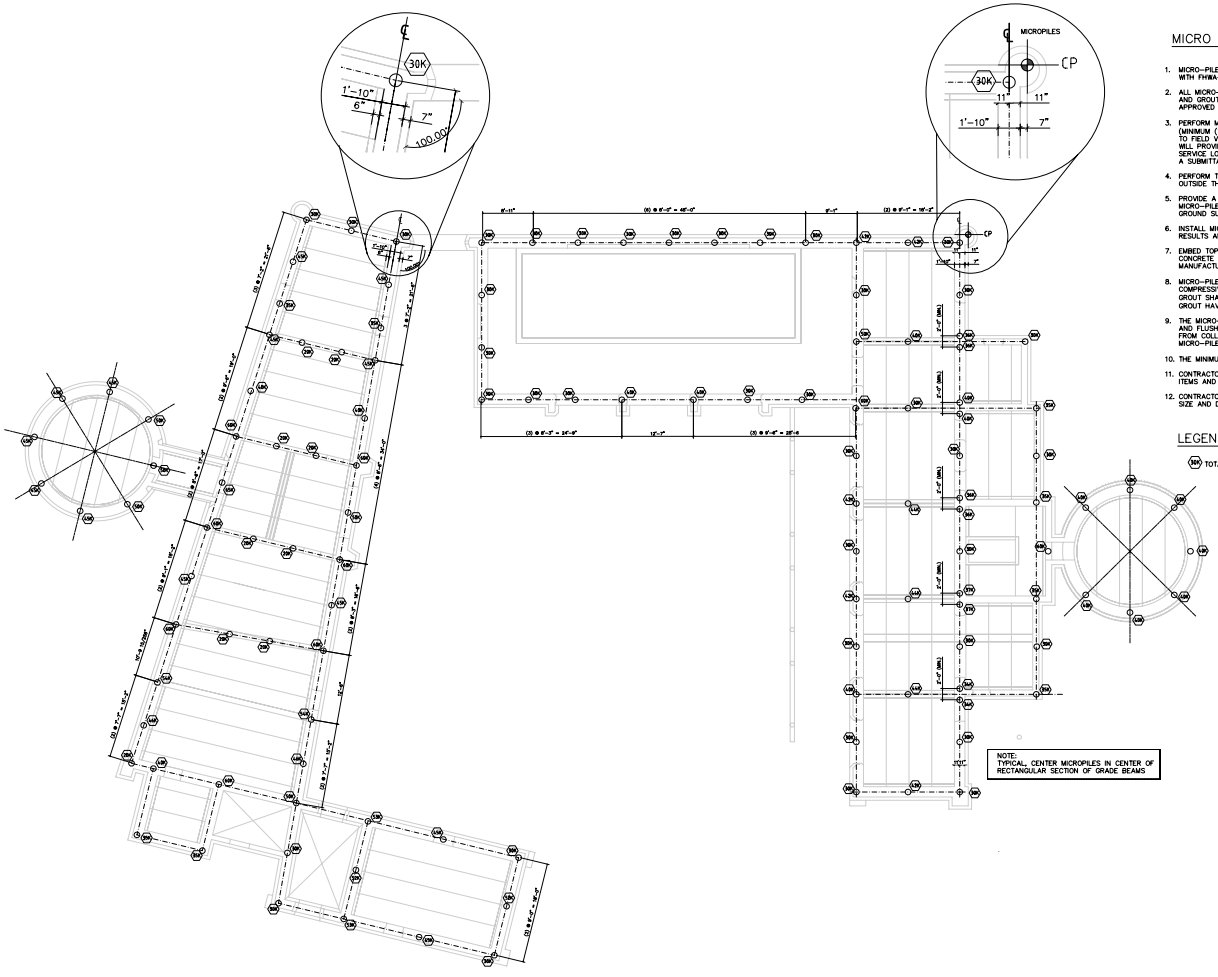
PV System Power, 1-Line Diagram

Construction Documentation



Construction Detailing & Engineering

Originally built of 24in thick adobe brick, the soil on the site was determined to be of inadequate quality to handle the load of such a dense wall structure. In order to preserve the dense look, feel and conditioning qualities of adobe, the wall structure was changed to a 24in pumice-crete composite, poured and stirruped over concrete grade beams. The grade beams span between 3in diameter micro-piles which allows the deep beams to span long distances within the earth without displacing too much clay. The micro-piles operate in friction within the earth, transmitting the structure's point loads evenly throughout the length of the pile's shaft while providing a minimally invasive and uniform foundation system for the structure.



MICRO PILE CONSTRUCTION NOTES:

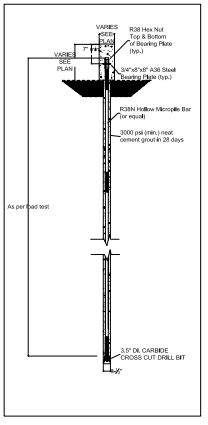
1. MICRO-PILE DESIGN, INSTALLATION AND TESTING IN ACCORDANCE WITH FHWA-NHI-05-039.
2. ALL MICRO-PILES SHALL BE HOLLOW BAR SIMULTANEOUSLY DRILLED AND GROUTED AS PER WILLIAMS FORM ENGINEERING CORP. OR APPROVED EQUAL.
3. PERFORM MINIMUM (2) SACRIFICIAL TENSION PILE LOAD TESTS, (MINIMUM (1) FOR EACH PILE SIZE), USING STEEL BEAM ASSEMBLY TO FIELD VERIFY THAT THE ULTIMATE LOAD CAPACITY OF THE PILE WILL PROVIDE A 2:1 FACTOR OF SAFETY GREATER THAN APPLIED SERVICE LOADS SHOWN. PROVIDE CALCULATIONS AND RESULTS AS A SUBMITTAL TO ENGINEER.
4. PERFORM THE LOAD TESTS IN AN AREA ACCEPTABLE TO THE OWNER OUTSIDE THE BUILDING PAD PERIMETER.
5. PROVIDE A PVC PIPE OR EQUIVALENT BOND BREAKER BETWEEN THE MICRO-PILE BAR AND THE GROUT FOR THE TOP 10 FEET WITHIN THE GROUND SURFACE, SEE GEOTECHNICAL REPORT.
6. INSTALL MICRO-PILES TO DEPTHS AS DETERMINED BY LOAD TEST RESULTS AND COORDINATION WITH GEOTECHNICAL REPORT.
7. EMBED TOP OF MICRO-PILE BAR ASSEMBLY INTO MID-HEIGHT OF CONCRETE GRADE BEAM USING STEEL BEARING PLATE AS PER PILE MANUFACTURER RECOMMENDATIONS.
8. MICRO-PILE GROUT SHALL CONSIST OF A 3000 PSI (MIN.) COMPRESSIVE STRENGTH GROUT IN 28 DAYS. THE MICRO-PILE GROUT SHALL BE TYPE I/II NEAT CEMENT AND WATER, WITH FINAL GROUT HAVING A WATER/CEMENT RATIO OF 0.45 (MAX.).
9. THE MICRO-PILE HOLLOW BAR SHALL BE SIMULTANEOUSLY DRILLED AND FLUSHED WITH AIR OR GROUT TO PREVENT BACKFILL MATERIAL FROM COLLAPSING IN THE DRILL HOLE AND COMPROMISING THE MICRO-PILE ELEMENT.
10. THE MINIMUM DRILL HOLE DIAMETER SHALL BE 3.5".
11. CONTRACTOR IS RESPONSIBLE FOR PROTECTION AND SAFETY OF ALL ITEMS AND PERSONNEL DURING MICRO-PILE INSTALLATION.
12. CONTRACTOR TO PROVIDE ACCURATE LOGS OF EACH MICRO-PILE SIZE AND DEPTH.

LEGEND:

(XXX) TOTAL DL+LL (SERVICE LOAD) IN KIPPS

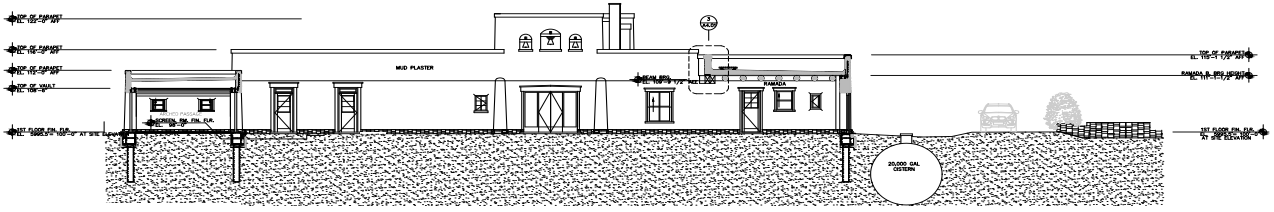
NOTE: PLEASE CONSULT THE COMPLETE GEOTECHNICAL INVESTIGATION FOR THE NEFF HACIENDA PUBLISHED BY EARTHWORKS ENGINEERING GROUP LLC. SEPTEMBER 15, 2008. PHONE: 505-899-4886.

NOTE:
TYPICAL CENTER MICROPILES IN CENTER OF RECTANGULAR SECTION OF GRADE BEAMS

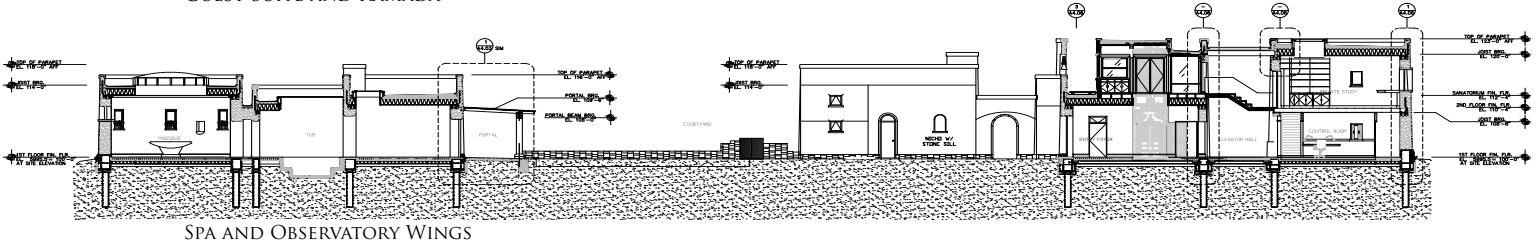


Micro-Pile Plan

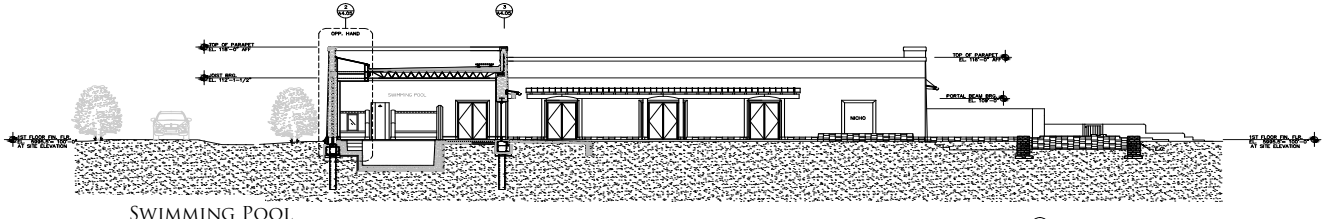
Typical Micro-Pile Detail



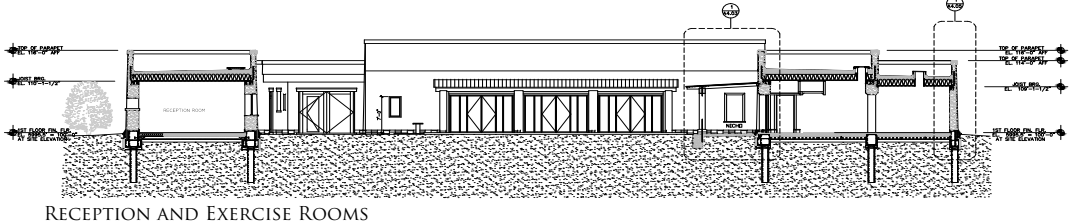
Guest Suite and Ramada



Spa and Observatory Wings

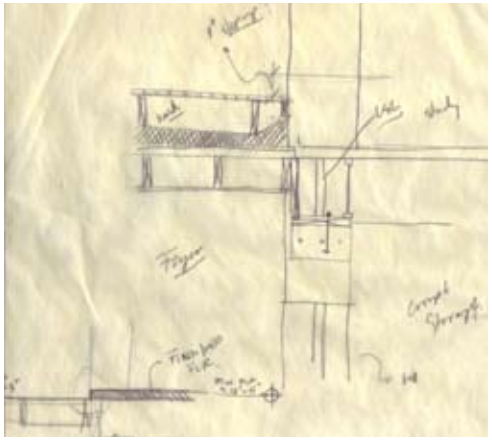


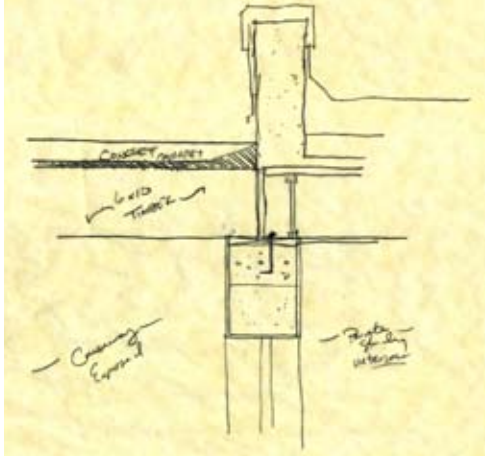
Swimming Pool

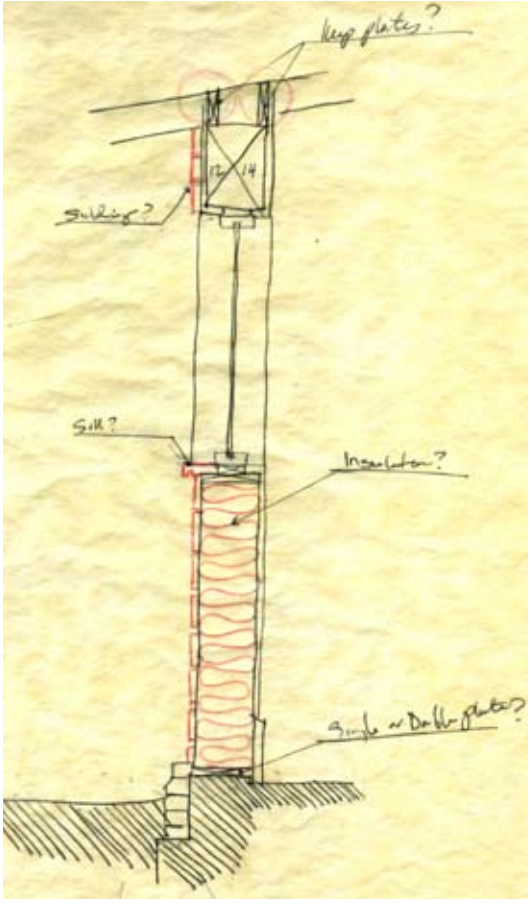


Reception and Exercise Rooms

Wall System Designs

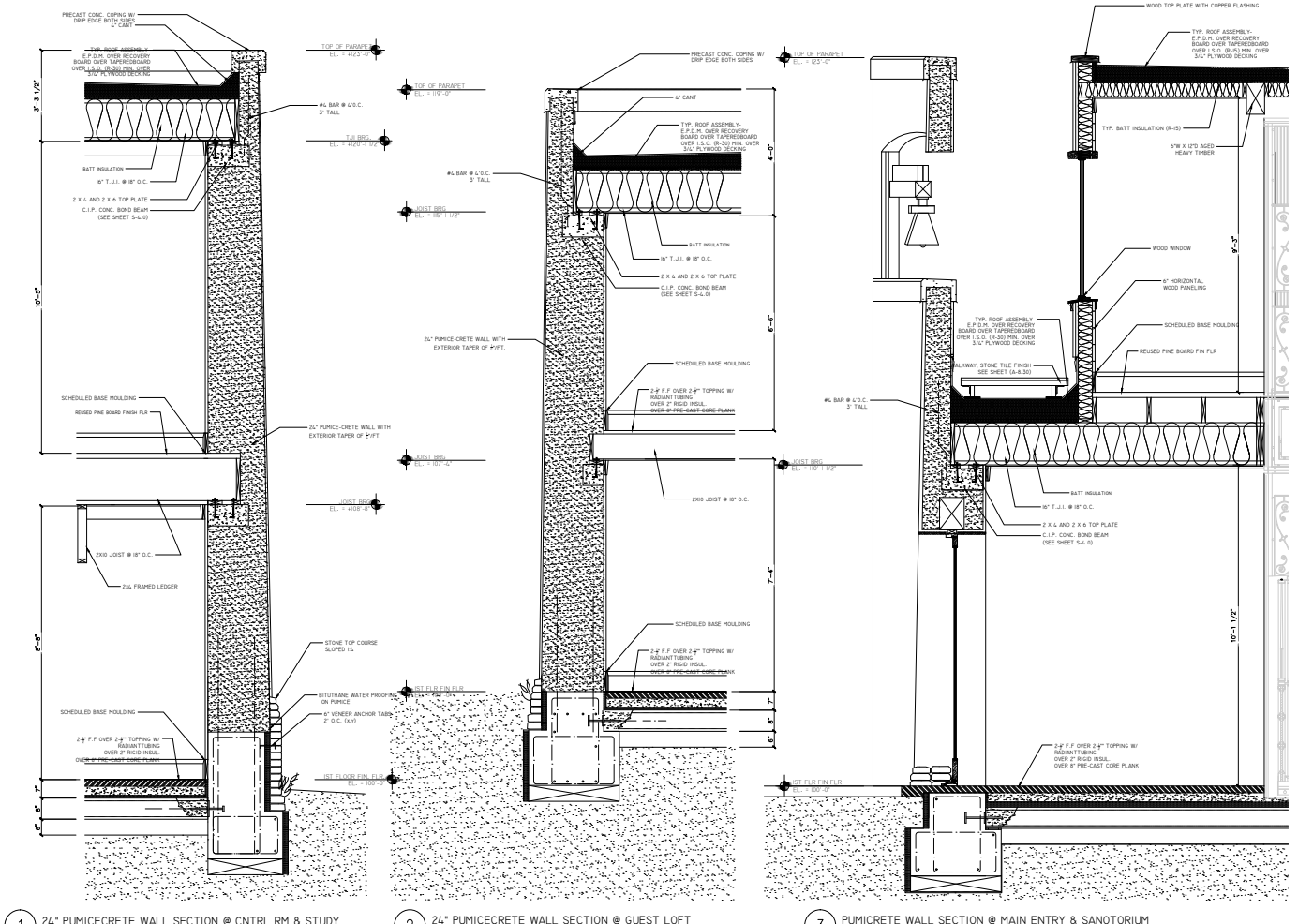






Once the building's wall structure had been changed from a stacked mass-bearing system of adobe brick and mud, to a lighter pumice-crete structure, the roof, footing and framing details similarly had to be redesigned. With the exception of the pool room, the roof framing of the entire building bears on 10x8in cast in place bond beams embedded in the pumice-crete walls. Joist and timber framing is either anchored into the bond beams with J-shaped anchor bolts, or directly porcupined into the pumice-crete. The thickness of the pumice walls over-insulates most spaces of the structure and the roof in most areas is a composite section of E.P.D.M over recovery board, on top of I.S.O. and 3/4" plywood decking, creating an R-40 roof system.

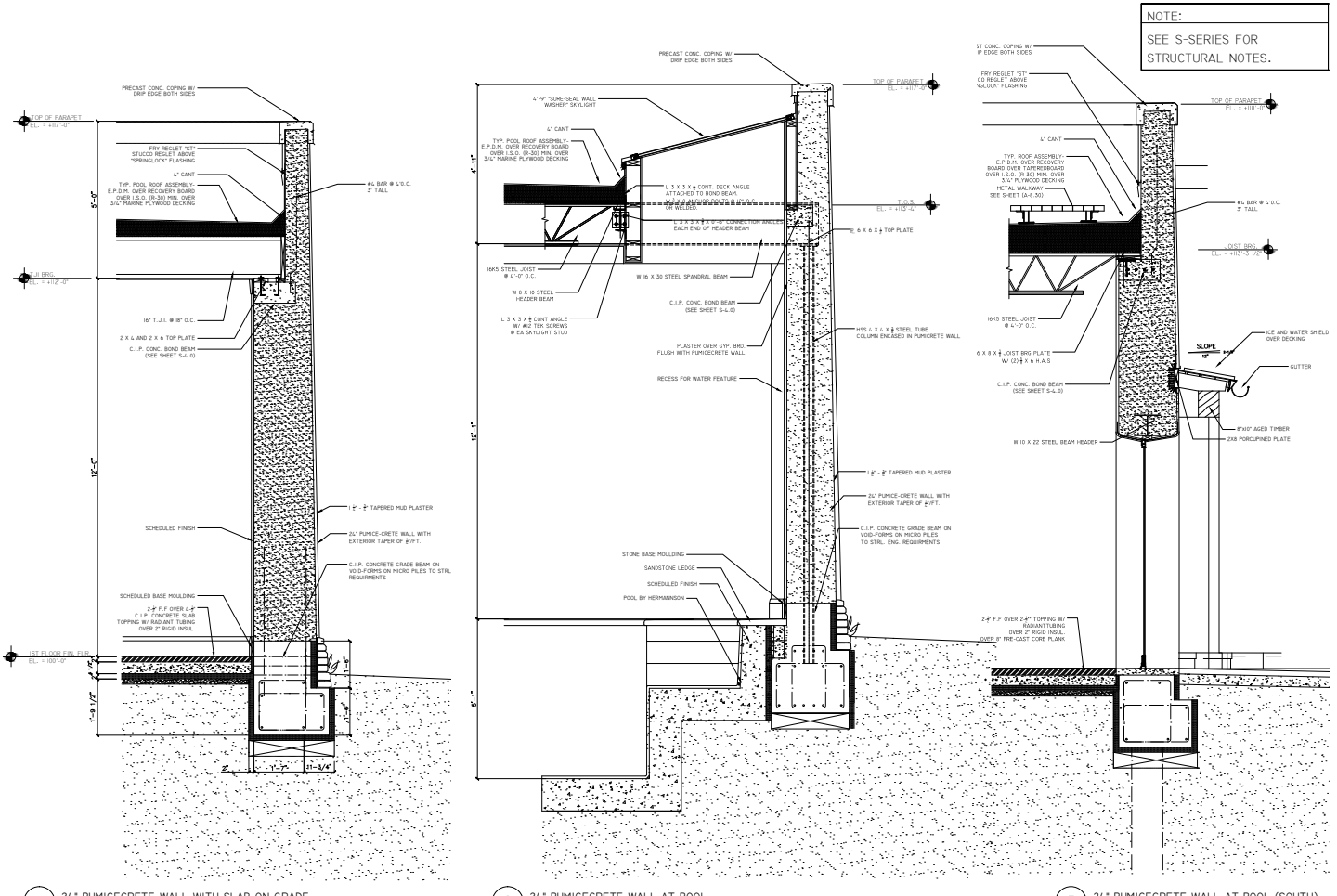
Top Far Left: Second floor joist-wall detail
Bottom Far Left: Typ. roof-wall detail
Left: Wall section through attached outdoor storage shed

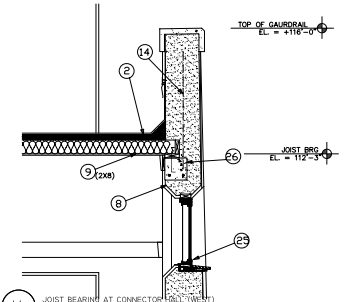


1 24" PUMICECRETE WALL SECTION @ CNTRL RM & STUDY

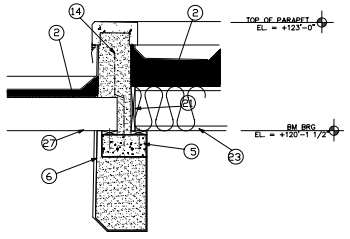
2 24" PUMICECRETE WALL SECTION @ GUEST LOFT

3 PUMICRETE WALL SECTION @ MAIN ENTRY & SANOTORIUM

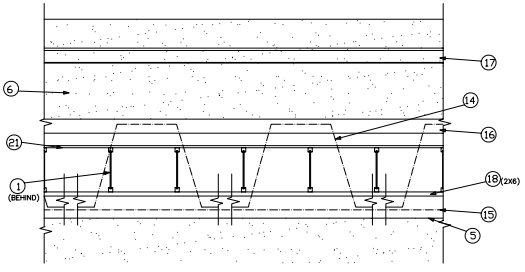

NOTE:
SEE S-SERIES FOR STRUCTURAL NOTES.
PRECAST CONC. COPING W/ DRIP EDGE BOTH SIDES
TOP OF PARAPET EL. +117'-0"
FRY REGLET "ST" STUCCO REGLET ABOVE "SPRINGLOCK" FLASHING
4" CANT
TYP. POOL ROOF ASSEMBLY- E.P.D.M. OVER RECOVERY BOARD OVER 1.S.O. (R-30) MIN. OVER 3/4" MARINE PLYWOOD DECKING
#6 BAR @ 4'0.C. 3' TALL
8'-0"
FLR BRG. EL. +112'-0"
16" T.J.I. @ 18" O.C.
2 X 4 AND 2 X 6 TOP PLATE
C.I.P. CONC. BOND BEAM (SEE SHEET S-4.0)
12'-0"
1'-9" TAPERED MUD PLASTER
SCHEDULED FINISH
24" PUMICE-CRETE WALL WITH EXTERIOR TAPER OF 6"/FT.
C.I.P. CONCRETE GRADE BEAM ON VOID-FORMS ON MICRO PILES TO STRL REQUIRMENTS
SCHEDULED BASE MOULDING
2'-6" F.F. OVER 6" C.I.P. CONCRETE SLAB TOPPING W/ RADIANT TUBING OVER 2" RIGID INSUL.
1ST FLOOR FIN. FLR. EL. +100'-0"
1'-9 1/2"
2'-6"
1'-7"
21-3/4"
1
24" PUMICECRETE WALL WITH SLAB ON GRADE
PRECAST CONC. COPING W/ DRIP EDGE BOTH SIDES
TOP OF PARAPET EL. +117'-0"
4'-9" "SURE-SEAL WALL WASHER" SKYLIGHT
4" CANT
TYP. POOL ROOF ASSEMBLY- E.P.D.M. OVER RECOVERY BOARD OVER 1.S.O. (R-30) MIN. OVER 3/4" MARINE PLYWOOD DECKING
L 3 X 3 X 1/4 CONT. DECK ANGLE ATTACHED TO BOND BEAM.
L 3 X 3 X 1/4 X 6" C.J. CONNECTION ANGLES EACH END OF HEADER BEAM
4'-11"
T.O.S. EL. +113'-0"
6 X 6 X 1/4 TOP PLATE
16K5 STEEL JOIST @ 4'-0" O.C.
W 8 X 10 STEEL HEADER BEAM
L 3 X 3 X 1/4 CONT. ANGLE W/ #12 TEK SCREWS @ EA SKYLIGHT STUD
W 16 X 36 STEEL SPANDRAL BEAM
C.I.P. CONC. BOND BEAM (SEE SHEET S-4.0)
PLASTER OVER GYP. BRD. FLUSH WITH PUMICECRETE WALL
HSS 6 X 6 X 1/4 STEEL TUBE COLUMN ENCASED IN PUMICRETE WALL
RECESS FOR WATER FEATURE
12'-0"
1'-9" TAPERED MUD PLASTER
24" PUMICE-CRETE WALL WITH EXTERIOR TAPER OF 6"/FT.
C.I.P. CONCRETE GRADE BEAM ON VOID-FORMS ON MICRO PILES TO STRL. ENG. REQUIRMENTS
STONE BASE MOULDING
SANDSTONE LEDGE
SCHEDULED FINISH
POOL BY HERMANNSON
8'-0"
2
24" PUMICECRETE WALL AT POOL
3T CONC. COPING W/ P EDGE BOTH SIDES
FRY REGLET "ST" CO REGLET ABOVE "KOLOCK" FLASHING
TOP OF PARAPET EL. +118'-0"
4" CANT
TYP. ROOF ASSEMBLY- E.P.D.M. OVER RECOVERY BOARD OVER TAPERED BOARD OVER 1.S.O. (R-30) MIN. OVER 3/4" PLYWOOD DECKING
METAL WALKWAY SEE SHEET (A-8.30)
#6 BAR @ 4'0.C. 3' TALL
JOIST BRG. EL. +113'-3 1/2"
16K5 STEEL JOIST @ 4'-0" O.C.
6 X 8 X 1/2 JOIST BRG PLATE W/ (2) 3/4 X 6 H.A.S
C.I.P. CONC. BOND BEAM (SEE SHEET S-4.0)
W 10 X 22 STEEL BEAM HEADER
SLOPE 1/4"
ICE AND WATER SHIELD OVER DECKING
GUTTER
8"X10" AGED TIMBER
2X8 PORCUPINED PLATE
2'-6" F.F. OVER 2.4" TOPPING W/ RADIANTTUBING OVER 2" RIGID INSUL. OVER 8" PRE-CAST CORE PLANK
3
24" PUMICECRETE WALL AT POOL (SOUTH)



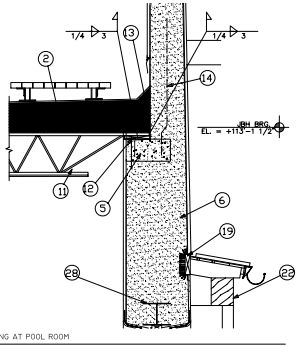
14 JOIST BEARING AT CONNECTOR WALL (WEST)



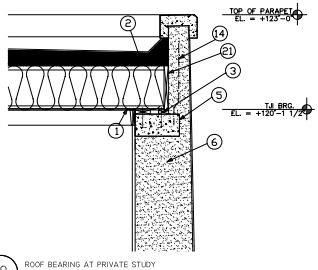
15 CAUSEWAY ROOF DETAIL (NORTH/SOUTH)



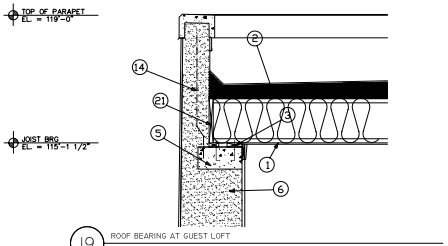
16 BOND BEAM AND REBAR DIAGRAM IN TYP. PARAPET



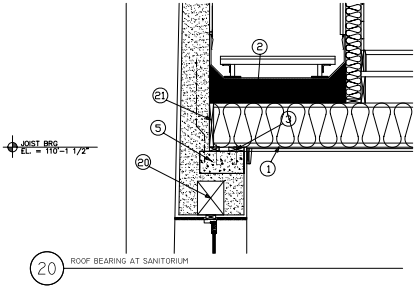
17 ROOF BEARING AT POOL ROOM



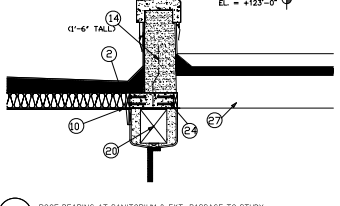
18 ROOF BEARING AT PRIVATE STUDY



19 ROOF BEARING AT GUEST LOFT



20 ROOF BEARING AT SANITORIUM



21 ROOF BEARING AT SANITORIUM & EXT. PASSAGE TO STUDY

KEYED NOTES:

1) TJI ROOF JOIST @ 24" O.C. W. FLAT BOTTOM CHORD BEARING. SEE FRAMING PLANS FOR SIZE.
2) ½" APA-RATED SHEATHING, SEE FRAMING PLAN NOTES FOR ATTACHMENT.
3) CONTINUOUS 2X6 AND 2X4 BEARING PLATE, ATTACH TO CONCRETE BOND BEAM WITH ½Ø X 6" ANCHOR BOLTS @ 24" O.C., STAGGERED WITH ROOF JOIST.
4) 1½" TIMBERSTRAND LSL TAPERED LEDGER TO MATCH JOIST PROFILE, CONNECT TO PUMICE-CRETE WALL WITH ½Ø X 8" ANCHOR BOLTS @ 24" O.C.
5) 16" (W) X 8" (D) X CONT. CONCRETE BOND BEAM WITH (4) - #5, LONGIT. (MIN). SEE CONCRETE LINTEL BEAM SCHEDULE FOR SIZES OVER OPENINGS. LINTEL BEAM SIZE & REINFORCEMENT GOVERN AT LOCATIONS WHERE LINTEL BEAM AND BOND BEAM COINCIDE.
6) 24" PUMICECRETE WALL, REINFORCE AS PER MANUFACTURER RECOMENDATIONS.
7) 10"(W) X 8"(D) X CONT. CONCRETE BOND BEAM WITH (2) - #5 LONGIT. (MIN). SEE KEYED NOTES ABOVE FOR LINTEL BEAM COMMENT.
8) 15" PUMICECRETE WALL, REINFORCE AS REQUIRED PER MANUFACTURER RECOMENDATIONS.
9) 2"X8" WOOD JOIST @ 16" O.C.DF-L, NO.2.
10) 2X6 WOOD JOIST, 24" O.C., DF-L, NO 2.,
11) 16#/S STEEL JOIST @ 4'-0" O.C.
12) PL 6" X 8" X ½" JOIST BRG. PLATE W/ (2)-5/8" X 6" H.A.S.
13) L 3 X 3 X ¼ CONT. DECK ANGLE, WELDED TO JOIST.
14) #4 BAR @ 4' O.C., 3' TALL
15) #5 BAR @ 3" FROM BTTM OF BOND BEAM
16) 4" ROOF CANT BEHIND PARAPET
17) SPRINGLOCK FLASHING BEHIND PARAPET
18) 2X10 WOOD PLATE CONNECTED TO CONC BOND BEAM W/ ½" X 8" ANCHOR BOLTS @ 24" O.C.
19) PORCUPINED WOOD LEDGER CONNECTED TO PUMICRETE WALL
20) 9 1/2"W X 12"D TIMBER LINTEL
21) I-1/2" TIMBERSTRAND LSL RIM BOARD, DEPTH TO MATCH JOIST DEPTH, CONNECT TO JOIST END WITH (2)-16D NAILS.
22) 8"WX10"D TIMBER LINTEL
23) 14" TJI/360 ROOF JOIST @ 24" O.C. BOTTOM CHORD BEARING BOTH ENDS.
24) 5 1/2" X 16" CONC. BOND BEAM
25) WOOD WINDOW. (SEE WD SCHEDULE ON SHEET A-7.00)
26) 8" X 8" CONT. BOND BEAM W/ (2) - #5, LONGIT. (MIN). SEE KEYED NOTES FOR LINTEL BEAM COMMENTS.
27) 6"W X 10"D HEAVY TIMBER BEAM.
28) W10 X 22 STEEL BEAM HEADER.

da Silva Architecture inc.

Project Team

Miguel da Silva, Principal

Raymond Gabriele

William Russell

Sunil Sakhlkar

Vahid Mojarrab

Da Silva Architecture Inc.

Founded in 2007 by the father and son team of Miguel and Robert da Silva, da Silva Architecture Inc. is a young, innovative architecture and design firm specializing in the design of custom sustainable solutions to residential and institutional programs. Together Robert and Miguel have worked, managed and owned firms around the world, including in Paris, Rome, Richardson Texas and Taos and Santa Fe New Mexico. Their work has ranged in breadth and scope from private residences to museum galleries, urban housing blocks and train stations.

da Silva Architecture Inc.

The Neff Hacienda & Observatory