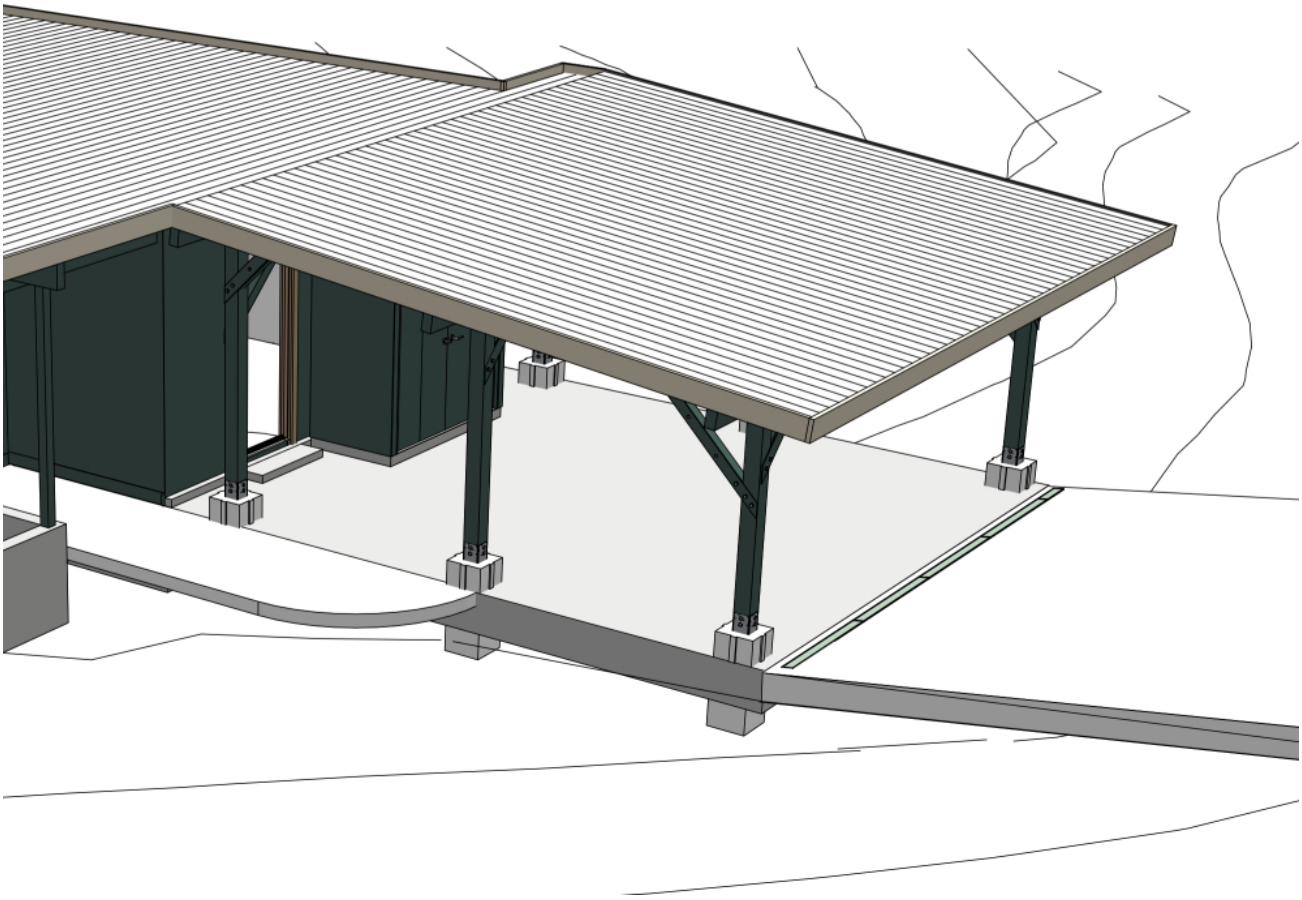
Structural Deficiencies SECTION 01

The carport is a post and beam structure that was connected primarily by gravity and friction and a few nails and screws with minimal capacity.

In addition there was significant post decay. Initially the posts were supported on spread footings and the parking area was gravel. At some point a few decades ago, the posts were encapsulated with a concrete slab up to 8 or 9 inches to provide a better parking surface. The encapsulating concrete trapped water around the columns bases which caused serious decay and eventually led to partial column failure, 90% section loss in some cases and differential settlement up to 7 inches.



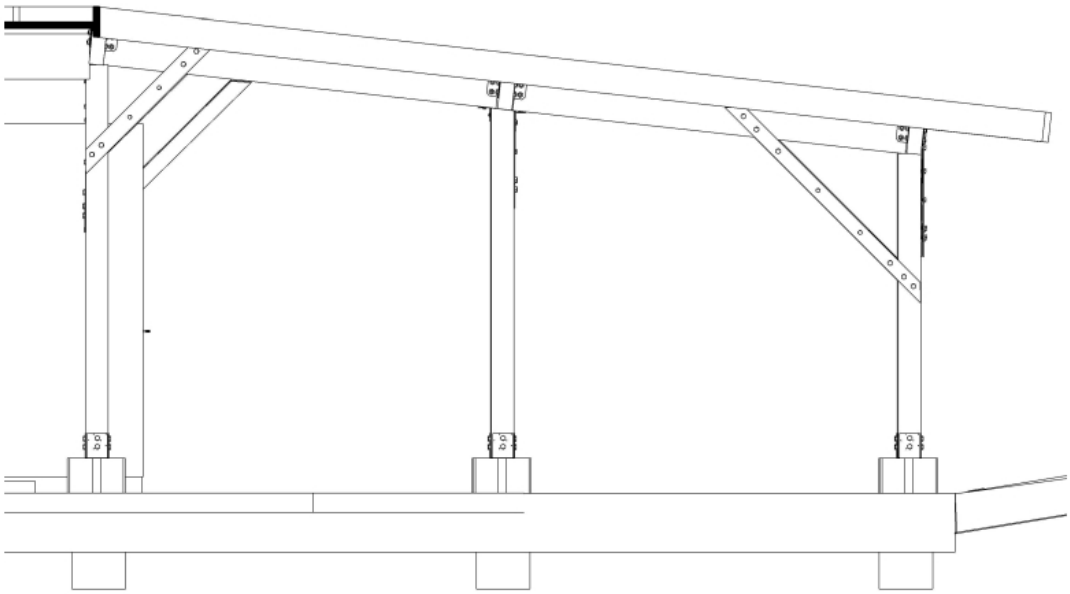
Carport [Fig: 0202.04]

Carport Repairs and Strengthening SECTION 02

Beam to beam, post to beam and brace to beam and post connections were strengthened with 1/8" galvanized angles or plates that were attached with lag bolts or galvanized threaded rods or bolts.

The carport was shored and leveled, the decayed bottom of the posts were removed and new concrete foundations

that raised the bottom of the posts above the parking slab were installed to prevent further decay. Each post was postively anchored with double (orthogonal) bases.



Carport North Elevation [Fig: 0202.05]

Carport West Elevation [Fig: 0202.06]

Seismic Model Inputs - CBC Requirements **SECTION 03**

Seismic demands on the carport were analyzed using a 3D FEM model (ETABS). The model includes the geometry, loads and stiffness associated with the post, beams and roof. Column bases, beam to post, and brace connections were modeled as pins.

The in-plane stiffness of the T&G roof is taken as 300 pounds/inch/inch using test data from [USDA1972].

[USDA1972] USDA Forest Products Laboratory. 1972. "Shear Stiffness Of Two-Inch Wood Decks For Roof Systems", U.S.D.A. Forest Service RESEARCH PAPER, FPL 155 1972

ASCE7-16; Risk II; Site D [Table: 0202.03]

Parameter	Value
SS	1.512
S1	0.685
FA	1
FV	1.5
SMS	1.512
SM1	1.027
SDS	1.008
SD1	0.685
TL	12
PGA	0.603
PGAM	0.603
FPGA	1
LE	1

Base shear coefficients [Table: 0202.04]

variable	value	[value]	description
SDS	1.00	1.00	short period design
R1	3.25	3.25	reduction factor
omega	2.00	2.00	overstrength factor

Seismic coefficent [Equ: 0202.02]

$$\mathrm{C_s} = \frac{\mathrm{SDS}}{\mathrm{R_1}}$$

C_s		R1	SDS
0.31 [-]	[0.31 [-]]	3.25 [-]	[-]