**Agency: Commerce, Community and Economic Development**

**Grants to Named Recipients (AS 37.05.316)**

**Grant Recipient: Wrangell Cooperative Association** **Federal Tax ID:** 92-6000144

**Project Title:** **Project Type:** Remodel, Reconstruction and Upgrades

# Wrangell Cooperative Association - Chief Shakes Tribal House Renovation

**State Funding Requested: $**500,000 **House District:** 2 / A

One-Time Need

## Brief Project Description:

Project will fund renovations and expansion of the Chief Shakes Tribal House in Wrangell.

## Funding Plan:

| | |
|---|---|
| Total Project Cost: | $500,000 |
| Funding Already Secured: | ($0) |
| FY2012 State Funding Request: | ($500,000) |
| Project Deficit: | $0 |

## Detailed Project Description and Justification:

Project will fund renovations and expansion of the Chief Shakes Tribal House in Wrangell. Chief Shakes House is a historic icon of Wrangell's native heritage. The house is in need of restoration to preserve its role as a community center and atrraction for visitors.

The project will make several improvements to the facility, including but not limited to construction of carving facility to be used to repair portion of the house and restore the surrounding Totem Poles. This community-based restoration will repair a place listed on the National Register of Historic Places and educate the youth and elders in Wrangell about the art of traditional carving. Repair of the Tribal House, along with the carving facility, can bring about a unique setting where the heritage of original settlers in Wrangell's area can be shared with residents and visitors alike. Shakes Tribal House is central to Wrangell's heritage, but needs financial assistance to preserve and repairing Chief Shakes Tribal House. The project is strongly supported by the community.

## Project Timeline:

FY12-FY13

## Entity Responsible for the Ongoing Operation and Maintenance of this Project:

Wrangell Cooperative Association



**Contact Name:** Weston
**Contact Number:** 465-3873

*For use by Co-chair Staff Only:*

$500,000 Approved

10:28 AM 5/27/2011

## Grant Recipient Contact Information:

| | |
|---|---|
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| | Wrangell, Alaska 99929 |
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Has this project been through a public review process at the local level and is it a community priority? [X] Yes [ ] No



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**Contact Name:** Weston
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Description

The Chief Shakes House is located on an approximately one acre island in the Wrangell small boat harbor. The building construction is of heavy cedar timbers and logs and nearly square in plan. The roof is a gable with two house beams, rafters and purlins. The foundation is of heavy timber piers. It is our understanding that the building was originally constructed in 1940. In 1983 structural repairs were done at the building's exterior posts that replaced the buried portion with new wood piers.

Plan dimension is approximately 40 by 43 feet with the long axis north-south. The gable roof ridge line runs north-south 17 feet above grade with the eaves at about 7 feet. Primary structural roof support is by four main cedar house posts carrying two north-south house log beams. The log beams support rafter and purlin roof framing. Additional roof support is provided by four exterior posts at each building corner and side posts midway along the east and west walls supporting eave beams which in turn support the lower ends of the rafters. Posts on each side of the north entrance, and a post at the center of the south wall aligned with the roof ridge, support roof rake beams. The rafters are 9-1/2 inch deep by 8 inch wide material on 6-1/2 foot centers and support similarly dimensioned purlins on 5 to 6 foot centers which support a planked roof with cedar shake roofing. A central smoke vent about 7 feet square opens in the roof supported on the north and south sides by typical rafters. The foundation is wood piers supporting each exterior post at just above grade with concrete footing pads. The house posts are supported by embedment into the ground. Construction material appears to be cedar specie with wood colors that are red and light yellow.

The perimeter walls are 3 inch planks varying in width from 12 to 18 inches set vertically in grooves in the eave beams and rake beams at the bottom ends, and sill beams at the top ends, to hold them in place. The sill beam spans between the corner and intermediate foundation piers. The floor is in three levels stepped 1-1/2 feet; a planked 6 to 7 foot wide upper platform at grade level around the floor perimeter, a concentric 3 foot wide intermediate level, and the lowest level a central planked area 20 feet square. At the floor center is a 7 foot square fire pit. Fill is retained between the levels by timber retaining walls. The exterior north face of the building is covered by a vertical plank facade that extends above the roof line.

Investigation/Deficiencies

The building is founded on dark organic soil mixed with a few cobbles and little coarse or fine material. The soil appears to be poorly drained. A one to 2 inch thick by one foot wide surface layer of crushed rock is placed against the building exterior perimeter. A significant area of the island has been leveled with fill retained by 2 to 3 foot high field stone retaining walls.

The foundations for the nine exterior posts are timber piers set on concrete pads. In work done in 1983, the exterior posts which had been set in the ground were cut off just above grade and the below grade supports were replaced with untreated cedar piers. During our investigation a pit was dug at the southwest corner and top of footing was found to be 2 feet below grade. The pier below grade became progressively more deteriorated with depth and at the footing several inches of wood could be easily carved out with the shovel. A combination of the soil and the concrete footing has kept the wood pier moist and given all the exterior piers are of similar construction it is likely all the piers are in similar condition. There are no visible positive connections between the exterior posts and the foundation piers.

The sill beams at floor level around the perimeter span between the foundation piers and support and are grooved on top to support the lower ends of the wall planks. These appear generally to be in good condition and produce wood shavings with a resinous smell when drilled. However, close to the corner posts the beams show signs of decay.

The four main house posts are about 20 inch diameter logs embedded into the ground with a concrete "collar" at grade. No investigation was done below grade due to the concrete at the post. It is not known to what depth the posts are embedded. The posts appeared in good condition above grade and produced wood shavings with a resinous smell when drilled into, and sounded solid when tapped with a hammer. Test drilling diagonally downward into the wood extending through the concrete also found wood in good condition. The house posts are within the building enclosure and do not show any sign of exposure to water.

The corner posts extend above the roof and are completely deteriorated over their full length due to constant penetration by water. Because of the extension of the post above the roof, runoff is forced to deflect around the column and the upslope flashing is all that prevents water from draining down the post and into the building. However, the posts are flashed with copper sheet that is ineffective due to wide cracks in the posts. Significant fungal growth is occurring on the interior surface of the northeast post. The bottoms of the corner posts were cut off just above ground level in the 1983 work and reset on new timber pier foundations.

The two side posts, located mid-way along the east and west walls, are somewhat protected by the eaves and are weathered but do not show significant signs of decay. Drill tests produced wood shavings that had a resinous smell.

The two posts on the north wall set on each side of the entrance are protected under the roof and by the exterior facade. The posts are open to view only on the faces inside the building due to the facade on the exterior. Drill tests produced wood shavings that had a resinous smell. Although no deterioration was found, inspection access is limited and protection of the inaccessible parts of these posts depends entirely on the copper flashing to prevent water from entering at the joint between the roof rake and the back of the facade.

The post mid-way along the south wall is completely decayed near the base. It appears that the post is exposed to long term saturation from the sill beam channeling water, which runs down the wall, to the post.

The eave beams are partially protected by the roof eave extension except where exposed at the extensions beyond the corner posts. The beams span between the corner posts and the side posts and are continuous over the side posts. The eave beams connect to the corner posts by passing through just below the roof rake beam. The eave beams appear to be in good condition and produce the resinous shavings with drilled except within one to 2 feet of the corner posts, the beams are significantly decayed. The beam is exposed to water through the decayed corner post and its own exposed extension beyond the post. The flaws in the flashing between the column and roof will allow water to flow to this area. The eave beam extensions are exposed and badly decayed. All aspects of the roof beam to corner column connections are exposed to weather and water.

The north roof rake beams cantilever over the entry posts and connect at the ridge. The beams are supported at the eave by the corner posts. The eave beams pass through the corner posts just above the eave beams and it seems likely that the beams are notched for the eave beams for 4 to 8 inch interference on the slope. The roof rake beams are protected by the roof and facade and are accessible only on the interior face and where the beams extend beyond the corner columns.

The south roof rake beams are similar to the north end rake beams except the beams are joined at the roof ridge on top of the center south wall post. The beams are exposed to the weather on the exterior although the roof rake extends 2 inches beyond the beam for a drip edge. At the connection to the corner posts the beams are significantly decayed on the interior.

The house log beams are about 18 to 20 inches in diameter and span 36 feet between the main house posts. The house beams are completely exposed to view and do not show signs of deterioration. The beams are protected by the weather enclosure and do not show any sign of exposure to water. The beams rest in a saddle groove in the top of the house posts and are attached with about six large spikes angled upward through the side of the post into the bottom of the beam.

The rafters are 9-1/2 inch deep by 8 inch timbers cantilevering over the house beams to connect to opposing rafters at the ridge with an interlocking connection. The lower ends are supported by the eave beams and extend to the exterior. The rafters appear to be in good condition. The rafter ends do not extend beyond the drip edge of the roof at the eave and are in good condition appearing only slightly weathered. A typical rafter at each side of the smoke vent supports the weather cover of the vent. There is a cross-tie timber between the house beams at about 1/3 span intervals. It was not determined how the rafters or the cross-ties are attached to the house beams.

The purlins are 9-1/2 inch deep by 8 inch timbers spanning between the rafters. The purlins appear in good condition with no evidence of exposure to water. The purlins are spliced irregularly with a step splice. The purlins support a plank roof deck.

The plank roof deck is 8 to 12 inch wide planks of undetermined thickness spanning between the purlins. There is no sign of water damage visible on the bottom side of the deck except in each of the building corners. In the corners it appears that small areas of the decking have significantly deteriorated due to water entering around the corner post.

The cedar shake roofing is deteriorated. It has not been determined how well the shakes are performing; however there is a layer of building paper under the shakes which may be providing significant back-up protection.

The exterior planks that form the walls are in good condition except along the south wall where the bases of the planks are significantly decayed at the sill beam.

Engineering Assessment

The building has been assessed for loads applied by snow, wind and seismic in accordance with the 2006 International Building Code (IBC) and the 2006 International Existing Building Code (IEBC).

The plank deck, purlins and rafters are of adequate strength for the required loads.

The two house beams are loaded to 130% or their capacity for a uniform snow load over the roof, and to 140% of their capacity for unbalanced snow load that considers asymmetric load due to snow redistribution by wind. The uniform roof snow load is 50.4 pounds per square foot. At the design snow loading the house beams will be loaded to their full ultimate capacity. Failure of the beams will be gradual and would be preceded by a large deflection prior to failure.

The main house posts are of adequate strength for the required loads.

The piers, corner posts, eave and rake beams do not retain enough of their original properties due to decay as described previously to be of assessable structural value. See the next section for repairing these elements for structural service.

The lateral resisting system of the building is not clear. Two methods for lateral support are suggested by the building's construction. One is that the building posts resist load through bending and are prevented from overturning by soil resistance on the buried portion of the post. The other is the walls resist load by shear. The first method is problematic because as we understand the bedrock is fairly shallow and would not allow the needed burial depth, the posts are not adequately connected to the buried piers, and the buried piers are in bad shape. The second method can be done by attaching the wall

planks to their supporting beams. In both cases it is necessary to install sheathing over the plank roof to create a roof diaphragm.

Proposed Remediation

The following discussion describes the necessary work that needs to be done to correct the structural deficiencies.

1. The existing soil fill at the building foundation is organic and does not drain well. This has caused buried wood foundations to stay moist and decay rapidly. One repair option is to replace the existing soil with clean granular fill that will be in contact with wood piers to improve the long term performance of the foundation. All buried wood should be replaced with preservative treated posts. As an alternative to replacing the existing fill, long term performance can be gained by using concrete piers instead of wood.

2. In light of the investigation at the southeast pier, it is expected that all of the perimeter piers are unsalvageable. In order to correct this problem, remove the concrete footings and replace the piers with cedar wood of similar dimension. The piers may also be replaced with concrete piers. Where wood is in contact with concrete a membrane is needed to protect the wood. Note that since the perimeter sill beams span between the piers, it unnecessary and impractical to build a perimeter foundation at grade, either of wood or concrete.

3. The four exterior corner posts are in unusable condition. In order to correct this, replace the posts and protect the exposed section above the roof from water infiltration. It is highly desirable to reconfigure the posts to eliminate the projection above the roof. It is also necessary to provide a positive connection between the posts and foundation piers.

4. The rake and eave beams are deteriorated near their corner post connections. An option to repair the beams is to cut off the beams at sound wood and replacing the damaged sections with new pieces using a step splice. It is necessary to investigate the north rake beams behind the front facade to determine whether the hidden portions need additional repair or replacement.

5. Load transfer between the roof and structure needs to be done with positive connections between the elements. It was not determined during our investigation how the purlins are connected to the rafters, and how the rafters are connected to the house beams. Either the connections need to be verified or positive connections provided.

6. It was not determined during our investigation what the condition of the main house posts are below grade. It is necessary to investigate the main house posts to determine the soundness of the posts below grade. If the house posts are found to be damaged it may be necessary to replace the posts.

7. The roof plank deck is deteriorated near the corner columns. It is necessary to investigate the condition of the top of the plank deck by removing the shakes and underlayment. It will be necessary to replace deteriorated planks.

8. A definite lateral load resisting system needs to be established for the building. One option to do this is to engage the plank walls to resist shear by attaching the planks at top and bottom to the beams and to install sheathing over the roof planking to create a roof diaphragm.

Long term protection of the structure from water damage should be addressed by the Architect. The connections of the rake and eave beams at the corner columns, as well as the corner column exposure above roof protection, are critical areas needing to be addressed for long term performance of structural elements. At the end walls, water sheeting down the wall planks enters the groove in the sill beam and conducts to the corner columns directly saturating the sill to column connections. Another area needing attention is the parapet like extension of the north facade above the roof line to prevent water entering off the roof to the back side of the facade planking. And in general, roof rakes, drip lines along the eaves and exposed structural members that extend beyond of the corner posts need consideration for protecting the structure from the weather.

## Summary and Conclusions

The cedar construction of the building has stood up well over time where it has not been subjected to moisture or in contact with organic soil. The main elements that are deteriorated and need replacement are the piers, corner posts, and rake and eave beam connections to the corner posts. Additional investigation is needed, notably the buried portion of the house posts. Determination of whether or not the house posts can continue in service is critical to the scope of the repair work. The style of construction of the building causes the corner posts with its beam connections to be exposed to weather necessitating close attention for protection from water. It is desirable to modify the corner posts to be protected by the roof. A lateral load resisting system needs to be established which likely will be connecting the wall planks to act as a shear wall. Attention needs to be given to protecting structural elements from exposure to infiltrating water.