

## Conversion of Traditional Farmer's House to the Urban-Rural Exchange Facility in Mountainous Region

-A case study on the local organization named "*Kiwanosato-ni-tsudoukai*"-

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### Abstract

Recently, some regional groups has started to supply facilities for the urban-rural exchange by reusing vacant houses and closed schools. Almost of existent buildings are old and rotten, so that need a large-scale repair. Therefore, it is difficult for regional inhabitants who have no specialty technique to repair enough.

This paper deals with a case study that farmer's house was converted as the urban-rural exchange facility by the local organization. This study aims to clarify the factor that large-scale repair was realized by the organization. Methods of this study are as follows. 1) The foundation process of the regional organization is shown. 2) A plan construction of farmer's house and old and rotten places before repairs are cleared. And repair contents are explained. 3) Attributions of participants, repair processes and methods of role allotment are analyzed. 4) Repair costs and procuring ways of materials and tools are examined. At the result, this case is 5 regional inhabitants took part in the repair. The factors of succeeding a large-scale repair are the following two. 1) Inhabitants who have experience repair of private houses worked mainly. 2) Retired people participated in the construction which don't need specialty technique.

**Keywords:** Mountainous Region, Local Organization, Repair, Role-share, Vacant House

### 1. Introduction

Regeneration activities have been started by private organizations (NPO corporations and community organizations, etc.) at every place. Several group utilized vacant houses, vacant shops and closed schools as base of operations. In the groups which very poor in funds, Utilizing existing buildings brings a big advantage from an cost point. There are some cases that volunteer does cleaning the building, disposing of trash and repairing to reduce the cost.

These techniques are notable way at the view point of architecture planning. On the other hand, almost existing buildings are rotten. So the following point may need at making use of the building. 1) a structure reinforcement, 2) an exchange of rotten materials, 3) a repair of roof and exterior, 4) a renewal of equipment, 5) a planning change to adapt use purpose, 6) a repair of interior.

But, there are next four issues to do these contents.

[1] a survey and a diagnosis by an expert, [2] training regional inhabitants who have no specialty technique, [3] a way of gathering large scale machines and tools, [4] securing material costs. Therefore, it is general to do only an interior repair as for 5) and 6).

This paper focuses the conversion of traditional farmer's house. The house was old and rotten. After a survey, a diagnosis and the renovation planning was done by an university, 1),2),5),6) have been realized by the local organization.

This paper aims to clarify the factor what solved the above four issues.

### 2. Methods

Methods of this study are as follows. 1) The foundation process of the regional organization is shown. 2) A plan construction of farmer's house and old and rotten places before repairs are cleared. And repair contents are explained. 3) Attributions of participants, repair processes and methods of role allotment are analyzed. 4) Repair costs and procuring ways of materials and tools are examined. 5) From the above, it is shown the factor that not only the interior improvement but also a structure reinforcement and an exchange of rotten materials are realized.

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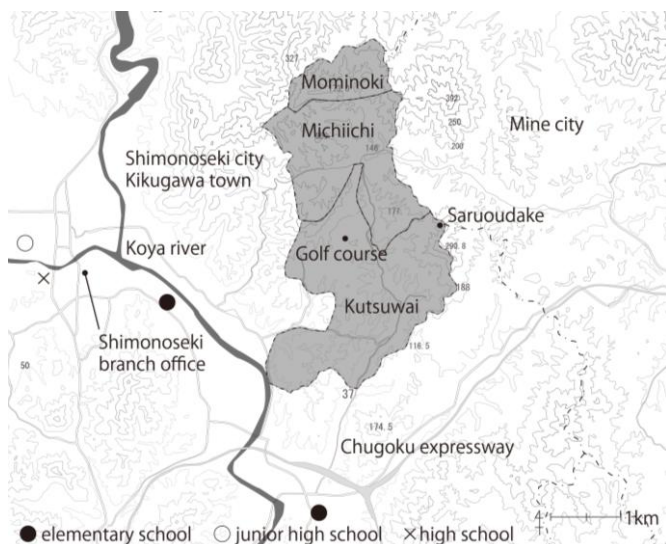


Figure.1 Object area of survey

Table.1 Population, household and aging rate (census in 2005)

area	popula tion	house hold	2000-2005 fluctuation rate of population ( % )	2005 population aging rate over 65 years old ( % )	2005 population aging rate over 75 years old ( % )
Kutsuwai	104	34	-14.8%	42.3%	17.3%
Michiichi	37	16	15.6%	59.5%	40.5%
Mominoki	15	5	7.1%	33.3%	20.0%
Sum	156	55	-7.1%	45.5%	23.1%

### 3. Outline of survey area

Object areas of the survey are three villages (*Kutsuwai*, *Michiichi* and *Mominoki*) in *Kikugawa* town *Shimonoseki* city. Figure.1 shows a survey area. This area is a beautiful agriculture village surrounded mountains. Public facility is only *Kutsuwai* elementary school which has become the branch school since 1947. There is no store like a super market. The area is located at 25 km from downtown in *Shimonoseki* city. We need 7 to 8 minutes to *Minenishi* interchange and *Odsuki* interchange by a car. Transportation convenience to the city is good.

Table.3 shows population, household and aging rate of three villages in 2005. This area is a small scale village including 156 people and 55 households. The aging rate is 45.5%, especially in *Michiichi* area, 60% people are over the age of 65.

### 4. The process of foundation and activity of "Kiwanoato-ni-tsudoukai"

*Kutsuwai* elementary school had no students since 2002 and closed in March, 2007(Figutr.2). Because this area was far from the city office, it wasn't given the public service like bus after the school closed.

From the problems, "*Kiwanosato-ni-tsudoukai*" have been made by retired people who live in the village and returned to the village since 2007. The



Figure.2 Closed school



Figure.3 O-house

Table.2 Progress of the activity

year	contents of activity
2003	<i>Toyohigashi</i> elementary school is closing temporarily.
March	<i>Toyohigashi</i> elementary school is closed.
May	Meeting at several times
2007	June " <i>Kiwanosato-ni-tsudou-kai</i> " is established.
Sep	"Community support project" of Yamaguchi Pre. Is adopted.
Nov	Potato field
Dec	Questionnaire survey is done.
2008	April The project of MLIT is adopted.
	The project of MAFF is adopted.
	The project for the Urban-Rural Exchange(Digging bamboo shoots etc) (April to December)
	July Area cram school for children named " <i>Chiiki-kodoko-juku</i> " (July to August)
Sep	<b>Repair work of O house is done till March.</b>
Feb	The abandoned cultivated land is mowed and cultivated. Bamboo grove has been kept up since February to March.
2009	April The project of MLIT is adopted. The project for the Urban-Rural Exchange(Digging bamboo shoots etc) (April to December)
	June " <b>Kiwa-no-yado</b> " is opened to experience the country life.
	July Area cram school for children named " <i>Chiiki-kodoko-juku</i> " (July to August)
	Feb Charcoal kiln is made.

purpose of this group is reusing the closed school and addressing the regeneration project of the area.

After the foundation, the number of the member increased from 20 to 80. The group cooperates with a welfare facility, the bamboo volunteer, university and so on. Table.2 shows progress of the activity. Urban-rural-exchange event, the country experience event for elementary school students called "*Chiiki-juku*" and making use of abandoned cultivated land have been held during three years after the foundation. Securing activity funds from the grant urged to develop the activity early.

The activity base has been the closed school, but there wasn't a cooking room. When the event was held, a town hall was used to cook and the meal must be carried from it to the closed school.

Therefore, it was necessity to prepare the wide space which can accommodate many people and have a dining space unified with a kitchen. "*Kiwanosato-ni-tsudoukai*" has made a contract with an owner of a vacant house which located near the closed school for free since February, 2008. Regional inhabitants have repaired O house till March, 2009. O-house was named "*Kiwa-no-yado*" and opened as a facility to experience the country life in June

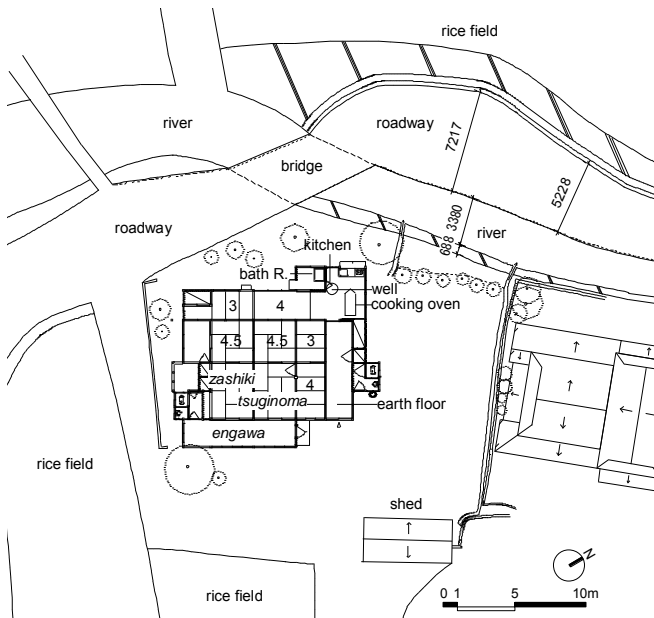


Figure.4 Layout and existing floor plan of O-house



Figure.5 Western outside



Figure.6 Dirt floor kitchen



Figure.7 Rotten pillar



Figure.8 Rotten floor

## 5. Investigation result and repair contents

### 5.1 Investigation and diagnosis

O house was the thatched roof house built over 100 years ago (Figure.3). Figure.4 shows a existing plan. This house is a traditional farm house. There are four rooms(*Zashiki* and *tsuginoma*, etc.) and four small rooms(under 4-tatami room). This house is a traditional farm house. There are four rooms(*Zashiki* and *tsuginoma*, etc.),four small rooms(under 4-tatami room), a well and an oven(*Kamado*)(Figutr.5,6).

*Nakazono* laboratory of Yamaguchi University investigated O-house during September to November in 2008. It found that the west side of the house slanted as a result of measuring the inclination of pillars and beams. Because the ground was loose along with a river to flow on the west side, the ground subsidence was caused and O-house slanted.

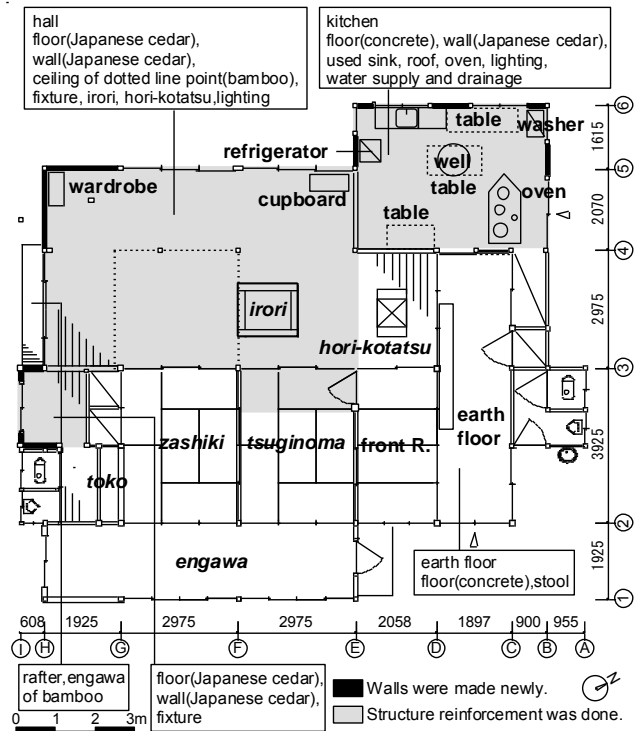


Figure.9 Floor plan after a repair and repair contents about interior and facilities



Figure.10 Level adjustment (Japanese-style room)



Figure.11 Level adjustment (Kitchen)



Figure.12 Kitchen after a repair



Figure.13 Interior

Specially, as for the pillar whose section loss was big, that whose inclination of the house broke in the cause were discovered (Figure.7). As for four Japanese-style rooms in the west (3 mat, 4 mat and two 4.5 mat rooms are included), the corrosion of the floor lower material was remarkable, and the deterioration of the pillar and the beam was confirmed, too (Figure.8). On the other hand, as for the east room called *tsudukima-zashiki*, it could use with the present condition. As for the roof as well, a leak didn't occur. As for the facility, an earth floor kitchen and a

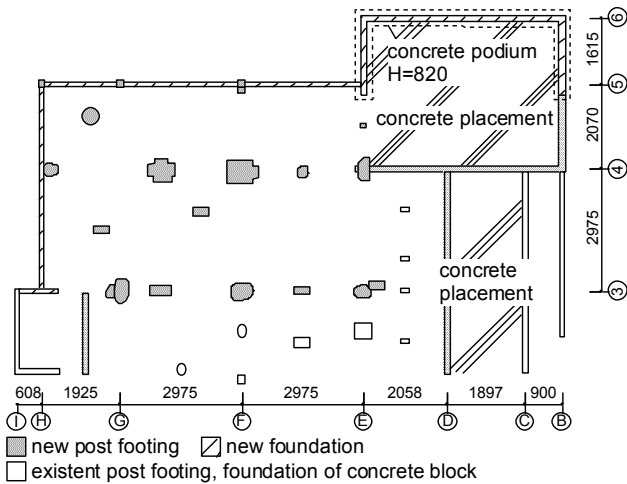


Figure.14 Foundation plan of repaired place

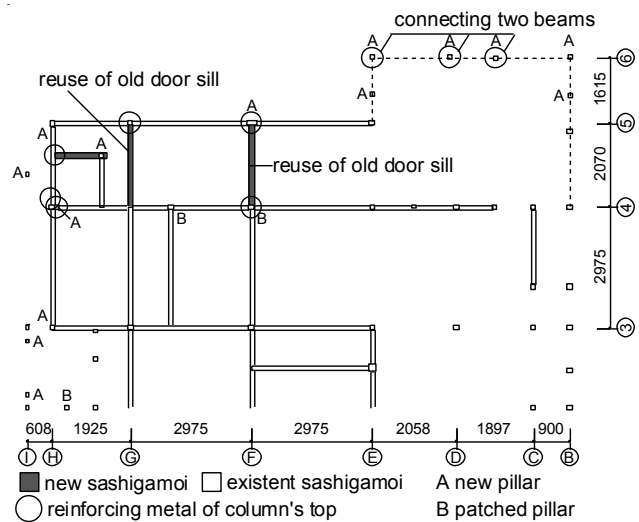


Figure.16 Sashikamoi plan of repaired place

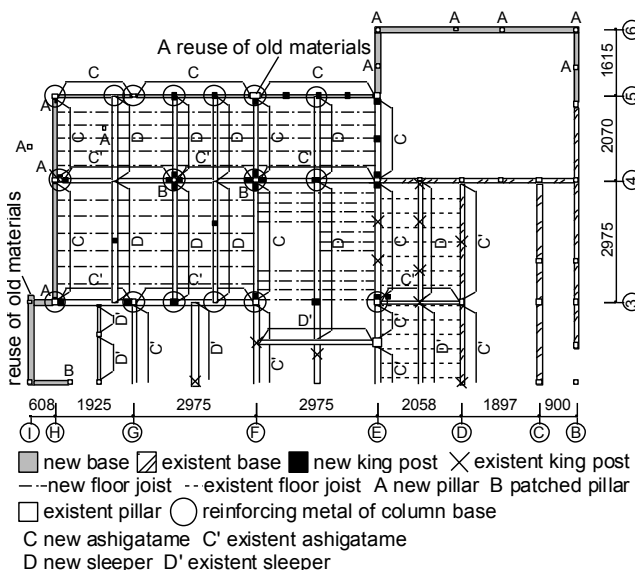


Figure.15 Floor framing plan of repaired place



Figure.17 Reinforcing metal of column base



Figure.18 Reinforcing metal of column's top

bathroom were damaged, and the renewal of it which adapted itself to the modern life was necessary. A rest room could be used though it was old style.

Because deterioration and corrosion of the west side were remarkable by the result of the investigation, it was judged that five of the next were necessary. 1) Repairing the inclination of pillars and beams and reinforcing joint parts by hardware as structure reinforcement. 2) Exchanging rotted pillars and materials below the floor. 3) Improving the facility of the kitchen and the bathroom. 4) Changing the floor plan to make a multipurpose hall. 5) Repairing the interior such as changing floor carpet, wall paper, window and door.

## 5.2 Repair contents

1), 2), 4) and 5) was decided to carry out in 2008 by a result of an investigation and diagnosis. As for the facility improvement of 3), it was prepared to the minimum in 2008 and will be repaired as soon as a budget can be secured in the future.

Figure.9 shows a floor plan after improvement and repair contents of the interior and the facility. As for the change of the plan composition, the bathroom which rotted most was dismantled, and a floor space of the earth floor kitchen was expanded (Figure.12). Five Japanese-style rooms were changed to a big space of 24 mats so that many people could eat there, and *Irori* (fireplace) was moved to (Figure.13).

The repair contents of the foundation are shown in the figure 14. As for the earth floor kitchen and the west side rooms, jack up was done, and horizontal adjustment and rotted pillars were removed (Figure.10,11). About the earth floor kitchen, the existent pillar and outer wall was removed, and the podium of the concrete block was made newly.

Contents of improvement under the floor are shown in the figure 15. All the bases of the circumference part were replaced. Most pillars of the circumference part were replaced, and rotten parts of two pillar's bottoms of No.4 axis were patched. Practically materials were changed to newly under the floor. As for column bases, *ashigatame* and sleepers, the structure reinforcement of joint were done by battledore bolts (Figure.17).

Figure.16 shows contents of *sashigamoi* level. Materials of the attic didn't rot, but two materials of No.G and F axis rotted, so they were changed by reusing old door sill. Joint of pillars and beams was reinforced by battledore bolts as well as column bases (Figure.18).

Table.3 Process of the repair work

contents of work	sum (hour)	work time of participants (hour)							2007			2008		
		A	B	C	D	E	F	G	Sep	Oct	Dec	Jan	Feb	Mar
temporary	18.5	8	6.5	4							Installation and dismantlement of scaffolds			
dismantlement	62.5	8	13.5	13	16	12					Dismantlement of kitchen and bath R.	Dismantlement of existent Irori		
level adjustment	144.5	8	42.5	32	27	36					The horizontal adjustment			
roof and exterior foundation	71	12	52	7					Demolition of outside wall and stone wall union			Maintenance of parking lot	Repair of roof	
wood	465.5	244	102	65	31	19	6			Foundation	Foundation	Foundation		
interior	223	80	38	46	49	10				Carrying of wood	Carrying of wood		Carrying of wood	
plasterer	89.5		41.5	9	32	7				Marking and joining	Joining		Interior	
fittings	27.5	16	4	3.5		4				Pillars and beams	Foundation and ashigatame		Floor joist and lintel	
cleaning	167.5		41	3.5	3	6	114			Installation of beams, ashigatame and battledore bolt			Rafter and outer wall	
water supply and drainage	21		21									Ceiling	Floor	Tatami
sum	1363.5	376	384	198	175	106	11	114				Ceiling	Wall	
												Correction of block joint	Kamado	Dirt floor concrete
													Fittings such as fusuma	
													Disposal of property	Cleaning in toilet
													Drainage trench	Cleaning under the floor
														Cleaning

Notes A,B,C,D,E : Participant ( for a fee ) F : Participant (free) G : Volunteer in region ( 16 persons )

table note 1) Work wasn't done because wood was waited to carry in November. 2) Students of an university participated to temporarily, dismantlement and level adjustment.

3) Electrical work was done during three days in the beginning of April, 2008.

From the above, characteristics of repair contents are following. As for the west side where corrosion was terrible, a large-scale improvement construction was carried out including the change of plane composition, the repair of exterior, the foundation work, the change of rotten materials and the structure reinforcement of column's top and bottom. As for the east side where it wasn't damaged, it was decided to use it in the present condition.

## 6. Process of the repair work and work share

The improvement construction wasn't entrusted with a dealer, and it decided to be carried out by Mr. A,B,C,D and Mr. E to make cost cheap. Mr.B,C,D,E have lived in the area. Mr.A and C have known each other and Mr.A has lived in next area.

The process of the improvement construction is shown in table.3. The term of repair work is 6 months from October, 2007 to March in 2008.

The dismantlement and the level adjustment of kitchen and bathroom that corrosion was the most remarkable were done in December, and pillars and beams were replaced at the same time. The foundation work and exchange of base, *ashigatame* and sleeper were done from January to mid February, and the structure reinforcement of column's top and bottom was done, too. The interior and plasterer construction were done in the center from the end of February to March.

Look at the work time of each of participants. The total of Mr. A's and Mr. B's working hours is both in more than 370 hours, therefore, it is understood that they are shouldered the center part of the improvement construction. Mr. A took on a woodwork and interior construction mainly because he had

Table.4 The way of preparing machines and tools

contents of work	name	size	owner or raising way	sum
temporary	pipe for scaffold	10	university	
	screwdriver	5	university	
dismantlement	large hammer	2	F	
	hammer deill	1	F	
	hammer	5	B· C	
	cat's paw	5	B· F	
level adjustment	hand saw	2	B· C	
	jack	15	B· two locals	
roof exterior foundation plasterer	horizontal machine	1	A	
wood, interior	concrete mixer	1	F	
	shavel	4	B· C· F	
else	trowel	2	F	
	swing drill	1	F	
	automatic plane	1	tsudoukai	
	circular saw	2	A· C	
	spare saw	3	purchase	2,058
	firmer chiesel	1	A	
	power drill	2	A· F	
	framing square	2	A· F	
	measure	5	A· B· C· F· Univ	
	power screw driver	3	A· B· C	
total of purchasing price	cutting machine	1	F	
	grinder	4	purchase	1,050
	clip lamp	2	purchase	3,556
	extension cord	2		

experienced the repair of houses after the retirement. Because he had the experience of the repair of houses and construction work in the village, he assisted Mr. A at woodwork, and exterior and water supply and drainage work were done almost alone by Mr. B.

When it is compared with Mr. A and B, Mr. C, D and Mr. E had a little work which needs professional techniques. They participated in level adjustment, foundation and interior work. Sharing work by the experience and the technology enabled the plural work to go on in parallel.

Table.5 The way of collecting materials

contents	name	size	number	correcting way
wood	pillar	120*120mm*2m	6	A local offered it free.
	pillar	120*120mm*2m	8	F offered it free.
	rafter	45*45mm*3m	10	F offered it free.
	sleeper	120*240mm*3m	3	Old materials of a demolished house.
	furring strips	45*22.5mm*3m	20	F offered it free.
	board of wall	20*10mm*3m	12	F offered it free.
	king post	120*150mm*2m	4	University offered it free.
fitting	window		4	Building materials shop offered used one free.

Table.6 Details of repair costs

contents of work	personal cost	material cost	sum
temporary	18,500		18,500
dismantlement	62,500		62,500
level adjustment	144,500		144,500
roof and exterior	71,000	15,000	86,000
foundation	68,000	72,000	140,000
wood	459,500	317,000	776,500
interior	223,000	184,000	407,000
plasterer	89,500	30,000	119,500
fittings	27,500		27,500
else	53,500	9,000	62,500
water supply	21,000	200	21,200
electricity		105,000	105,000
sum	1,238,500	732,200	1,970,700

## 7. The way of preparing tools, materials and repair costs

### 7.1 Tools and materials

Table.4 shows the way of preparing machines and tools. As for machines and tools which were necessary for the repair, the purchase amount of money was less than 10000 yen by buying extension cords and spare saws. Participants in the improvement construction brought other machines and tools.

Especially, machines and tools which Mr. F owned were used many times in a series of processes. Mr. F is a dairy farmer and he has machines and tools for that because he had built and repaired the cowshed. As for the automatic plane, a local building material store gave used one to *Kiwanosato-ni-tsudoukai* for free.

Table.5 shows the way of collecting materials. Mr. F provided wood materials which he bought when a cowshed was built for free, and the local resident and a university provided that, too. Old materials were received when a vacant house was dismantled in the village, and that were reused as a sleeper. About fittings, used aluminum sash windows were offered gratis by the building material store. Material except for the above was purchased.

### 7.2 Repair costs

Table.6 shows Details of repair costs by contents of the work. As for the improvement fee, personnel costs

occupy more than 60% of the total with about 200 thousand yen. Hourly wage of 1000 yen was paid to participants A ~ E from *Kiwanosato-ni-tsudoukai*. Personnel costs were restrained at a low price when it was compared with general carpenter's wage, because wages on a day didn't reach 10000 yen. As for the material cost, woodwork and interior construction spent most of it with about 500 thousand yen. It was possible to restrain a cost because pillars floor joists were provided gratis. Cement and blocks were purchased at 70 thousand yen by the foundation work. Electric construction costs about 100 thousand yen.

About 1400 thousand yen of repair costs were paid by the subsidy of MLIT, and the rest of about 600 thousand yen were paid by the own funds of *Kiwanosato-ni-tsudoukai*.

## 8. Conclusion

In this case study, a large-scale improvement construction was realized during about a half year by five local residents. Those factors are the following.

- 1) As a result of the investigation and the diagnosis of a university, it was cleared that the countermeasure of the inclination of a house and decrepit materials were necessary as a local resident's common recognition.
- 2) Locals who have experienced repair of private houses worked mainly. Retired people participated in the construction which didn't need specialty technique.
- 3) It was easy to prepare tools because participants had large machines and tools to use at his job or hobby. So a tool cost was below 10 thousand yen.
- 4) Participants were not professional craftsmen, so the personal cost was restrained at a low price when it is compared with general carpenter's wage. The cost was economized by offering materials from locals and reusing used wood materials.

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