

REPORT OF SURVEY
S.S. "TUTSHI"
CARCROSS, YUKON
June 17 - 20, 1987



S.S. TUTSHI

June 17 - 20, 1987

The S.S. TUTSHI was originally designed and constructed by Mr. A. E. Henderson, of Carcross, Y.T., for the British Yukon Navigation Co. Ltd., (White Pass Yukon Route) in 1917, and remained in her intended service, carrying passengers/freight until retirement, in the fall of 1955. At that time, she was reportedly hauled/blocked, and then shifted to her present site in 1972, receiving little, if any, maintenance during that 17 year period. We understand that she was purchased by the Yukon Government in 1970, and that her restoration was initiated in 1982. During our attendance, the renewals and repairs performed to date reflected a good quality of workmanship throughout.

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S.S. TUTSHI

The information contained in the following report, was obtained during our inspection of the S.S. TUTSHI, at Carcross, Y.T., from June 17 - 20, 1987, and through consultation with concerned parties. The survey consisted of non-destructive soundings of the ship's various scantlings, visual inspection and occasional drill testing where necessary. No removals were made in order to expose concealed areas, and the inaccessible compartments were not opened up for inspection.

It should also be noted that the recommendations outlined herein are offered as guidelines for the restoration and preservation of the vessel, relative to her intended use as an historical land based exhibit. Alongside each recommendation, a PRIORITY NO. (1 - 4) was provided in order to assist the Owner's in their scheduling of the restoration project. The more critical deficiencies requiring attention/repair within the next year are assigned a PRIORITY NO. 1, and those which can be deferred, are given a higher number, with PRIORITY NO. 4 indicating either optional or long term consideration.

GENERAL/STRUCTURAL INFORMATION.....	1
DETAILS OF INSPECTION - SECTION I (BILGES).....	2
- SECTION II (FREIGHT DECK).....	5
- SECTION III (EXTERNAL GEAR).....	6
- SECTION IV (HULL).....	7
- SECTION V (SALOON DECK).....	10
- SECTION VI (TEXAS DECK).....	11
- SECTION VII (MISCELLANEOUS).....	13
- SECTION VIII (CONCLUSIONS).....	14

REPORT OF SURVEY

S.S. TUTSHI - June 17 - 20, 1987
Government of the Yukon Territories

PRINCIPAL PARTICULARS

LENGTH OF DECK:	167'	BEAM MOLDED:	35.25'
PORT OF REGISTRY:	Vancouver, BC	OFFICIAL NO:	138695
TONNAGE (GROSS):	746.31	TONNAGE (REGISTERED):	1040.5
TYPE:	Steam driven stern wheeler	CONSTRUCTION:	Carvel planked fir

SCANTLINGS (Approximate dimensions)

BOTTOM PLANKING: 3" x 13 1/2" - centreline to waterline

TOPSIDES: 2" x 5 1/2" - waterline to shear

FRAMING: 3 1/2" x 7 transverse at 16" centres (sawn)

KEELSONS: 3 1/2" x 17 1/2" longitudinals (3 at full length)
3 1/2" x 17" longitudinals (2 partial - excepting forepeak)
3 1/2" x 17" longitudinals (2 partial - boiler and engine
compartments only)

DECK BEAMS (FREIGHT DECK): 2 1/2" x 4" at 16" centres

DECK STRINGERS (FREIGHT DECK): 3 1/2" x 6" longitudinals at approxi-
mately 5' centres)

DECK STRINGER TO KEELSON DIAGONALS: 3 1/2" x 3 1/2" (except 3" x 7"
outboard two runs)

DECKING: 2 1/2" x 4 1/2" (1/2" T & G upper decks)

UPPER DECK BEAMS: 3 1/2" x 1 1/4"

UPPER DECK STRINGERS: 2 1/2" x 7 1/2"

DECK OVERLAY: Canvas (stapled)

DETAILS OF INSPECTION

SECTION I (BILGES)

This section covers the damages noted below decks, in the five hull compartments. For reference purposes, the frames and deckhead beams are numbered sequentially from the stem - aft, with the four transverse full height bulkheads numbered 15, 51, 72 and 94.

A) Stem - B/H at Frame #15

CONDITION	RECOMMENDED REPAIR	PRIORITY NO.
- small area of deterioration along the bottom of No. 2 frame, stbd. side	- section to be cut back to sound material & filler piece installed	3
- forward 1" tie rod (from deckhead to keelson) missing on stbd. side & fractured on port side upper	- stbd. section to be replaced & port section to be welded	2

B) Frame #15 to B/H at Frame #51

- area of deterioration along the upper surface of centreline keelson through approximately 6" depth, between frames #43 & #46. Additionally, the keelson is cracked over 24" in length between frames #43 & #45	- damaged area to be cut back to sound material, graving piece fitted & doubler (3" x 17") through bolted to extend a minimum of 2' fore & aft of repair	2
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C) Frame #51 to B/H Frame #72

- frame #60 cracked at bilge turn, port side	- damaged frame section to be sistered	4
- area of deterioration in frame #55 at port bilge turn, extending inboard approximately 2'	- cut back to sound material & section of frame to be replaced. A sister frame, extending a minimum of 12" beyond replacement to be through bolted in place	2
- area of deterioration in deckhead affecting 3 planks between deck beam #10 & B/H (#72), approximately 4' inboard of port hull side. The uppermost edges of the deck beams are also deteriorated	- access to affected area to be gained through false deck above & planks/frames cut back to sound material. Replacement decking to be fitted to extend aft, beyond bulkhead to frame #73 & graving pieces to be fitted in deck beams	3

CONDITION	RECOMMENDED REPAIR	PRIORITY NO.
D) Frame #72 to B/H and Frame #94		
- area of deterioration in deckhead, adjacent to, and at deck beam #78, stbd. side	- decking to be removed to provide access to affected beam. Beam end to be cut back to sound material & replaced. Doubler to be through bolted alongside, extending a minimum 12" beyond butt. Decking then to be replaced between frames # 77 & #79	1
- redundant box structure (sump) at B/H #72, centreline, variously deteriorated throughout	- entire structure to be dismantled & removed or rebuilt to original specifications	2
- area of deterioration in centreline keelson between frames #83 & #85, centre timber	- section to be removed & filler piece fashioned & installed	3
- areas of deterioration alongside through bolts & tie rods in centreline keelson at frames #74 to #79 inclusive	- affected areas to be cleared of rot, filled with tar & keelson fitted with steel cap (minimum 3/8" channel) prior to reinstalling nuts	2
- areas of deterioration in seven deck planks at bulkhead #72, from port hull side, inboard	- affected areas to be cut out & replaced, & sister frame through bolted alongside	
- extensive deterioration in base of aft king post	- lowermost 18" (approx.) of king post to be cut away to sound material & graving pieces glued/through bolted in place prior to reinstallation of steel collar	1
- laminated king post carrier deteriorated in way of step	- transverse carrier to be opened up during repairs to king post & rebuilt as necessary	1
- extensive deterioration in chock at base of diagonal brace immediately abaft king post	- chock to be removed & replaced as original	1
- extensive deterioration along the lower edge of frame #86, stbd. side at bilge turn	- frame section to be cut back to sound material, replaced with new & sistered, insuring a minimum 12" overlap of both butt joints	1

CONDITION	RECOMMENDED REPAIR	PRIORITY NO.
D) Continued...		
- frame #93 cracked at stbd. bilge turn	- sister frame to be through bolted alongside fractured area	4
E) Frame #94 to transom		
- Areas of deterioration in centreline keelson between frames #94 & #97 along both upper & lower surfaces	- areas to be cleared of deterioration, sealed with tar & reinforced with doublers on either side between frames #94 & #100	3
- aft compartment access stairway damaged (1" x 6" construction)	- stairway to be rebuilt as original	1
- diagonal brace between intermediate bottom stringer (port) & deckhead at frame #116, adrift	- diagonal member to be resecured	3
- areas of deterioration in diagonal brace at centre of steering rack between frames #117 & 120	- damaged brace to be removed & replaced with new	3

GENERAL

- All accessible nuts within the bilge areas are to be snugged up, taking care not to crush/distort the structural members in way.
- All five compartments are to be thoroughly cleaned of dirt, droppings, shavings and sawdust prior to and regularly throughout repairs.
- The splined bottom seams are to be cleared of debris and remain opened up to enhance ventilation.

SECTION II (FREIGHT DECK)

The second section deals with damages noted throughout the freight deck, including the foredeck, interior cabins and aft machinery space, etc.

A) Foredeck

CONDITION	RECOMMENDED REPAIRS	PRIORITY NO.
- the aftermost 2' of the lower bulwark plate, stbd. side is split & deteriorated	- affected area to be cut away & replacement piece fashioned & bolted in place	2
- the aftermost 5' of the port side bulwark is split & deteriorated	- as above	2
- fore - aft deck seams in way of winch/bitt are opened up	- seams to be hardened-up/ recaulked as necessary	1

B) Freight Deck

- both king posts are variously checked & opened up	- fill as required, sand & refinish	3
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C) Aft Machinery Space

- stbd. pitman arm alley deteriorated on inboard side at its aft, lower sections	- deteriorated portions of alley to be cut away & replacement members fashioned & installed	2
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GENERAL

- The foredeck should be thoroughly cleaned, surfaces prepared and recoated, utilizing an anti-skid paint.
- Both midships "stores" compartments are to be refinished internally, as original.
- Galley area to be cleaned and recoated.
- Freight deck to be sanded and coated with linseed oil.
- Crew's/engineer's quarters in machinery space to be cleaned and refinished throughout.

SECTION III (EXTERNAL GEAR)

This section covers damages recorded in the outboard running gear, including rudders, pitman arms, paddle wheel and associated fittings, etc.

CONDITION	RECOMMENDED REPAIR	PRIORITY NO.
- the steel strut for the stbd. monkey rudder assembly is distorted	- strut to be removed, straightened & reinstalled as original	1
- extensive deterioration in the paddle wheel's longitudinal support timber, stbd. side, alongside aft steel bracket	- area to be cut back to sound material & new section(s) of timber to be scarfed in place	1
- the "10 o'clock" paddle wheel spoke on the unit's inboard stbd. course is deteriorated near the hub	- area to be cleared of rot & filled with cement	1
- the transverse support beam for the aft monkey rudder assembly is checked/cracked	- affected area to be cleaned & sealed prior to recoating	2
- extensive deterioration in the paddle wheel's support timber, port side, particularly in way of the wheel's bearing support assembly	- timber to be cut back from a point 5' ahead of the bearing, extending to it's aftermost end, & replaced with new. The timber's vertical stiffener is to be fitted with doubler & through bolted	1
- the lowermost strakes have variously separated from the main rudder blades	- affected strakes to be drawn back into place & equipped with 1/4" x 3" steel gussets, which are to be bolted through the rudder blade, upper & lower	1
- the through hull bolts for the outboard bulwark, adjacent to the port side pitman arm are loose	- all fasteners for the paddle wheel supports are to be snugged up following completion of structural repairs. Additionally, all exposed fasteners, collars & steel brackets etc., are to be coated with rust preventative paint ("TREM-CLAD" or equal)	2
- the 8" x 8" support pillar for the stbd. paddle wheel beam is split & twisted	- damaged support pillar to be replaced & additional 8" x 8" pillars fitted at the after ends of the paddle wheel beams on both port & stbd. sides	1

SECTION IV (HULL)

Concerns areas of deterioration and deficiencies in the transom, exterior hull sides, bottom planking and shear sponsons. The transom and hull planks are lettered and numbered respectively, for identification purposes.

A) Transom

CONDITION	RECOMMENDED REPAIR	PRIORITY NO.
- lowermost transom plank sagging/separated from adjacent plank, approx. 2"	- the affected plank is to be jacked back into position, & the seam filled. Additional cribbing to be installed directly beneath transom	1
- area of deterioration in the port side, outboard end of transom plank "B"	- outboard 2' of plank to be removed & replaced	1
- small area of deterioration at the port side outboard end of transom plank "C"	- area to be cleared of deterioration & filled with cement	2

B) Port Hull Side

- areas of deterioration in the aftermost ends of hull planks #1, 2 & 3 (below assumed waterline)	- plank sections to be cut back to sound material at nearest available frame & new plank ends installed	2
- extensive deterioration in the 2" x 12" sponson clamp, between beam ends (stations) #111 & 118	- affected length of clamp to be removed & replacement timber bolted in place	1
- additional deterioration in sponson clamp between beam ends (stations) #79 & #90	- repairs conducted as above	1
- beam ends #84 - #87 inclusive & adjacent filler pieces are deteriorated	- beam ends to be cut back to sound material, replaced & sistered prior to installation of new filler pieces	2
- approx. 12" x 4" area of hull strake beneath beam end #50 is deteriorated	- area to be cleared of deterioration & filled with cement at plank scarf	1

CONDITION	RECOMMENDED REPAIR	PRIORITY NO.
B) Continued...		
- sponson guard adrift at beam end #43	- guard timber to be resecured as necessary	2
- the forwardmost end of the keel & forefoot are split/checked	- both areas to be cleaned & filled with tar	3
- the stemband has pulled away in several locations	- to be tightened up or re-fastened as required	4
- the exterior sheet metal bilge sheathing is perforated in numerous areas, & could well conceal damaged planking in way	- the sheet metal sheathing is to be permanently removed to expose the hull planking. Any deterioration then found is to be repaired	2
- outboard catwalk plank between beam ends #70 - #95, are severely checked/cracked	- entire length of plank to be removed & replaced	3
C) Starboard Hull Side		
- the stbd. sponson clamp is split & a section missing between beam ends (stations) #6 & #13	- damaged section to be removed & replacement fashioned & installed	3
- #6 beam end broken	- beam end to be cut back & replacement end installed & sistered with through bolts	3
- small areas of deterioration in hull plank butts immediately beneath beam end #11	- affected area to be cleared & filled with cement	2
- sponson guard loose at joint adjacent to beam #15	- guard to be refastened where necessary	3
- sponson guard split & deteriorated between beam ends #45 & #54	- approx. 12' length of guard to be removed & replaced with new	3
- sponson clamp between beam ends #44 & #62 variously deteriorated	- affected length to be removed & replaced with new	2

CONDITION	RECOMMENDED REPAIR	PRIORITY NO.
C) Continued...		
- sponson clamp between beam ends #75 & #88 are extensively deteriorated	- affected length to be removed & replaced with new	2
- sponson clamp extensively deteriorated between beam ends #107 & #115	- repair as above	2
- deck beam ends #79 to #87 inclusive, adjacent filler pieces, decking & interior partitions variously deteriorated	- area to be opened up & rebuilt as original. Beam ends to be sistered & through bolted	1
- deck beam ends and/or sisters #111, 112 & 113 are deteriorated	- cut back to sound material & sister where necessary	2
- stbd. catwalk seams opened up	- all catwalk seams to be cleaned & resealed	1
- inboard catwalk plank between beam ends #58 & #60 deteriorated	- repair as above	2
- inboard catwalk plank between beam ends #75 & #78 deteriorated	- repair as above	2
- doubler plate under cleat between beam ends #83 & #87 deteriorated	- doubler (mounting pad) to be removed & replacement fashioned & installed	2

SECTION V (SALOON DECK)

Contains results of our inspection of the Saloon Deck, including walkways, railings, companionways and accessible cabins, etc. Every fifth railing stanchion has been numbered for identification purposes.

CONDITION	RECOMMENDED REPAIRS	PRIORITY NO.
- areas of deterioration in the #42 railing stanchion, stbd. side	- stanchion to be removed & replaced in its entirety	1
- evidence of deterioration alongside the aftermost lifeboat davit, & its mounting pad, stbd. side	- canvas overlay to be peeled back to provide access & affected areas repaired	2
- the wire mesh at the stbd. railings aft end is pulled away	- mesh to be resecured where necessary	2
- the outboard fascia plate at the extreme aft end of the stbd. side deck is deteriorated	- affected member to be removed & replaced with new	2
- the overhead deck beam between railing stanchions #47 & #48, stbd. side, is slightly deteriorated	- area to be cleared & new section of beam scarfed in place	3
- uppermost end of full height railing stanchion (#39) stbd. side, deteriorated	- replacement stanchions to be installed	4
- #49 lifeline stanchion, port side, is loose & deteriorated	- stanchion to be resecured, cleared of deterioration & area filled	1

SECTION VI (TEXAS DECK)

Covers deficiencies/deterioration in the Texas Deck, including walkways, railings, accessible cabins and wheelhouse, etc. Here again, every fifth railing stanchion has been numbered for reference purposes, as have the exterior cabin doors.

CONDITION	RECOMMENDED REPAIRS	PRIORITY NO.
- wire mesh between railing stanchions #9 & #10, stbd. side, torn	- section of mesh to be repaired/replaced, & balance of recently installed mesh to be painted as original	4
- evidence of deterioration in stanchion base #22	- replacement stanchion to be supplied & fitted	2
- the mild steel hinges on the exterior cabin doors are slightly rusted	- hinges to be cleaned & coated with rust preventative paint or replaced with some non-ferrous	4
- area of deterioration at the overhang for the wheelhouse access ladder	- affected area to be cut back to sound material & replaced	2
- the metal shrouds at upper deck level on both queen posts are not watertight	- shrouds to be properly bedded & secured to queen posts	1
- wire mesh between railing stanchions #10 & #11, as well as between #17 & #18, port side, torn	- both sections of mesh to be removed, replaced & coated as original	4
- evidence of deterioration in port railing stanchions #42 & #44	- both stanchions to be removed & replaced with new	2
- the steel brackets between various railing stanchions & adjacent decking are variously rusted	- all mild steel brackets are to be cleaned & coated with rust preventative paint	4
- area of deterioration in cabin top coaming directly above cabin door #14, port side	- section of coaming to be cut away & replaced with new	3
- the overhang on the wheelhouse cabin top is slightly deteriorated at the port corners, fore & aft, & the fascia boards are broken	- affected areas to be rebuilt as original	3

CONDITION	RECOMMENDED REPAIRS	PRIORITY NO.
SECTION VI Continued...		
- the wheelhouse sun visor/ dodger (canvas) is weathered	- a replacement canvas visor is to be sewn & installed	4
- the exposed lengths of both king posts are checked/cracked	- areas to be cleaned & sealed to minimize moisture entry	2
- the uppermost ends of both queen posts are exposed	- both queen post ends are to be sealed with tar	2

SECTION VII (MISCELLANEOUS)

- All paints used during the restoration process are to be of good quality marine grade.
- All fasteners and hardware used in external applications are to be of non-ferrous metal, galvanized or coated with rust preventative paint ("TREM-CLAD" or equal) prior to installation.
- The existing putty used as sealant for the plexiglass cabin windows is not suitable for this application, and a flexible bedding/sealing compound, i.e. "SIKA-FLEX" is recommended.
- All upper deck drains are to be routed/connected to ensure all rain water is freed well outboard the vessel, thereby minimizing further deterioration of the catwalks/sponsons and other lower structural members.
- As noted previously, all hull through bolts are to be carefully tightened, taking care not to damage or crush the timbers in way.
- A flexible sealing compound ("SIKA-FLEX" or equal) is to be used as bedding material for all external applications, and where sealing of deck planking is required.
- The recaulking of the hull topsides is to be performed by a competent shipwright to ensure the planking is not distorted or damaged.
- The underbody seams (splined) should remain open and clear of debris and loose oakum, etc., to facilitate proper ventilation of the bilges.
- A more durable, rubberized coating is to be applied to all canvas clad exterior decking (i.e. "THORPES EZEEDUCK") in such a manner as to eliminate the water collecting indentations alongside many of the mild steel staples.
- The existing steel brackets and collars, etc., located externally throughout the vessel are to be treated with rust preventative paint ("TREM-CLAD" or equal).

SECTION VIII (CONCLUSIONS)

- This survey was carried out conscientiously, and the results as submitted are considered to be accurate under normal procedures used when surveying vessels of this type.

Considering the vessel's age and other factors, the vessel was found to be in reasonably good condition. When all the major structural aspects are rectified and all exterior surfaces are well coated with a good quality paint, the annual maintenance can be kept to a minimum.

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