



MISSOURI DEPARTMENT of TRANSPORTATION UNDER BRIDGE INSPECTION UNIT SPECIFICATIONS

GENERAL PROVISIONS:

The intent of these specifications is to describe a truck mounted, interchangeable, hydraulic powered, under bridge inspection unit and work platform that is able to position three (3) workers and their tools quickly and safely a minimum of **38'** horizontally underneath a bridge deck, as measured from the edge of the deck, for inspection and maintenance duties. It must also be able to extend a minimum **32'** above the bridge deck and extend down approximately **47'** below the bridge surface. With the work bucket completely extended, the truck can be driven slowly forward or backward to provide continuous or overlapping areas of coverage. The vehicle must operate within an 8 foot, 6 inch lane so that closures are kept to a minimum.

The under bridge inspection unit shall include a truck chassis, flatbed body, basket arm and work platform, and any necessary equipment, components, accessories or options required to furnish a complete unit ready for operation. The aerial unit shall be truck-mounted, hydraulic-powered. The basket arm shall have three (3) articulating boom sections, two rotation turrets, and a 600-pound capacity heated fiberglass basket with fully proportional controls. The work platform shall have two (2) articulating boom sections, two rotation turrets and a 1500-pound capacity. The platform shall be capable of carrying at least 750 lbs. at the far reach of the platform while 750 lbs. is carried at its midpoint.

The completed unit when fully loaded with equipment, operators, etc., should comply with the following loads. The maximum allowable single axle weight shall be 20,000 pounds and the maximum tandem axle group weight shall be 40,000 pounds, with not more than 21,000 pounds for any one (1) axle of the multi-axle group.

The completed unit when fully loaded with equipment, operators, etc., must comply with length and width limits for the State of Missouri.

Complete unit must be manufactured and assembled in accordance with the latest adopted OSHA, SAE, and ANSI regulations. The unit must be manufactured using the safest and best materials in a manner that will protect personnel at all times whether they are elevated or on the ground.

The Missouri Highway and Transportation Commission reserves the right to waive technicalities and to reject any or all bids; and no bid is final until formally accepted by the Commission.



Performance:

The under bridge inspection unit shall be capable of placing inspectors in positions above, under and outside of the bridge to perform in-depth inspections of Missouri's bridges.

It shall be the bidders responsibility to meet all specifications and performance requirements mentioned herein for the under bridge inspection unit. The bidder shall submit drawings of the proposed device with a detailed description including dimensions and clearances and capacities with the bid proposal.

Under Bridge Inspection Unit:

Overall Dimensions:

- A. Overall stored length: 40'-00" (maximum)
- B. Overall stored height: 13'-06" (maximum)
- C. Overall stored width: 102" (maximum)

All components of the aerial device with inspection basket and work platform options shall be stored inside the length and width of the flatbed body.

Under Bridge Inspection Aerial Device Components:

The following under bridge inspection aerial device assembly shall consist of the following minimum components:

- A. Pedestal and sub-frame/mainframe
- B. Rotation turrets.
- C. Booms.
- D. 3-Person work basket.
- E. Hydraulic system and PTO power source.
- F. Auxiliary diesel engine.
- G. Controls and safety system.
- H. Truck stabilizers.
- I. Communication system.
- J. Accessories.
- K. Labels.
- L. Work Platform.



A. PEDESTAL & SUB-FRAME/MAINFRAME

The pedestal and sub-frame/mainframe shall be constructed of high strength steel and shall have sufficient strength to withstand all torsional stresses imposed by the boom assemblies with the maximum rated load in the work platform.

The counterweight is not to exceed the width of the truck when the crane is in the stowed or operating positions. The pedestal/mainframe shall rotate about the centerline of the truck 270 degrees, thus allowing full operation from either side of the truck.

The pedestal and sub-frame/mainframe shall be mounted behind the truck cab. They shall be adequately fastened to the chassis for the maximum implied loads. If bolts are to be used as fasteners and the torque will need to be checked then the bolts need to be accessible.

B. ROTATION TURRETS:

Each turret shall rotate on a heavy-duty shear ball type bearing protected against dirt and moisture, and provided with a means for appropriate lubrication.

A reversible hydraulic orbital motor driving a self-locking gearbox, which shall prevent freewheeling in case of hydraulic failure, shall power all rotational turrets.

A counterweight shall be attached to the pedestal assembly and shall rotate with the under bridge inspection aerial device on the opposite side, and stay within the width of unit when the booms are deployed.

C. BOOMS:

The under bridge inspection aerial device shall be equipped with three articulating, hydraulically operated booms. All boom sections shall be welded box construction of high strength steel. All telescoping boom sections shall be equipped with high wear capacity nylon support rollers or wear pads.

Boom swivel pins shall be of high strength steel, turned, ground and polished. Pins shall be either threaded and secured with self-locking nuts, or they shall be secured with bolts. Swivel bearings shall be of high strength material with provision for lubrication and replacement.

Booms shall have full hydraulic powered cylinders. All cylinders shall be double acting and have automatic safety check valves directly mounted to the cylinders. The cylinder walls shall be honed. Boom lift cylinders shall be equipped with nitrate rods.



D. FIBERGLASS WORK BASKET AND WORK PLATFORM:

One (1) 3-man work basket with a minimum 600lb. capacity shall be hinged at the end of the third boom and shall automatically be kept level at all times by a hydraulic leveling system. The work basket shall have minimum dimensions of 60" long x 40" wide x 42" deep. The work basket shall have built in access steps to provide a safe means of ingress and egress.

There shall be a minimum of three (3) attachment points in the work basket for employees to attach safety harness lanyards. These attachment points shall be of a sufficient size to accommodate a Miller Brand double locking snap hook. Attachment points shall meet all ANSI requirements.

A work basket cover shall be supplied unless the work basket is stowed upside down in which all the controls, heaters, electrical outlets, etc. shall be protected from the weather.

Work platform to be capable of reaching minimum 38' under bridge. It shall have a minimum length of 30' and shall not require assembly/disassembly for use or storage, and must be stowable within the truck's length and width. The booms for work platform unit must include as a minimum 2 rotating turntables and 2 articulating booms. Platform to have a 1500 lb capacity with at least 750 lbs at platform far end and with 750 lbs at center of platform. Boom 2 to include access ladder for worker ingress and egress onto work platform. Boom 2 to include ANSI approved fall arrest system. Platform design must accommodate safety harness lanyard attachment along platform length. Platform width to be minimum of 4'. Platform to have capability of being self-leveling. Training shall be provided by the manufacturer on inspection platform and work platform interchangeability operations. Road worthy trailer needed for proper storage of the work platform and inspection platform while NOT on the aerial device shall be included by the manufacturer, and shall be capable of storing both the inspection platform and the work platform.

E. HYDRAULIC SYSTEM AND PTO POWER SOURCE:

The primary source of power for operation of the under bridge inspection aerial device shall be a hydraulic system that shall be provided by a PTO-driven, transmission-mounted hydraulic pump.

All movements of the under bridge inspection aerial device shall be made by hydraulic pressure. The hydraulic system shall have the capacity to perform more than one unit movement simultaneously while operating any accessories. The hydraulic system shall be sufficient to properly operate the under bridge inspection aerial device and accessories



with greatest safety. All valves, flow meters, gauges, pumps, filters, hoses, fittings, and P.T.O. shall be furnished. The hydraulic system shall meet J.I.C. Standards.

All hydraulic cylinders shall be double acting with direct-coupled safety check valves as protection, in case of pump or hose failure.

The hydraulic fluid reservoir shall be an adequate size to properly handle the demands of the specified under bridge inspection aerial device and any accessories. The manufacturer/bidder shall determine the actual size of the hydraulic fluid reservoir. The hydraulic fluid reservoir shall have baffles, clean out access, exterior sight level gauge, and drain plug.

Hydraulic fluid shall be filtered through a return line 10-micron filter and a 10-micron pressure line filter both with replaceable elements. A 100-mesh strainer shall be located on the suction side of the reservoir. All filters shall be accessible for easy element replacement.

Shut-off valves shall be provided and installed to allow for cleaning of strainer and changing of the filter elements.

The hydraulic pump shall be of sufficient size and type to properly handle the demands of the specified under bridge inspection aerial device and any accessories.

The hydraulic system pressure shall be preset as determined by the manufacturer/bidder and shall be adjustable. A main relief valve shall protect the hydraulic system.

Pressure gauges shall be provided for the under bridge inspection aerial device and any hydraulically operated accessories to allow for verifying the manufacturer's specified pressure setting. If additional hydraulic circuits need to be independently regulated then a pressure gauge shall be provided for each of these hydraulic circuits.

The hydraulic fluid transmission lines shall be seamless steel tubing and extra heavy piping with forged or machined steel fittings or flexible hoses. The flexible hoses shall be wired braid reinforced and shall have a weather and abrasion resistant covering. Bursting pressure rating shall be at least 400% of the system operating pressure.

If the hydraulic system is subject to overheating then the hydraulic system shall include a hydraulic fluid cooler that shall be either oil or air type.

F. AUXILIARY DIESEL ENGINE:



An auxiliary engine will be supplied to operate the primary hydraulic system in case of a system failure. It shall have the capacity to perform more than one unit movement simultaneously. This auxiliary engine shall include the following as a minimum:

1. 12-volt electrical system with keyed ignition, electric starter, and alternator. It shall receive its electrical source from the chassis's batteries or an independent battery.
2. Fuel connection to the chassis fuel tank(s).
3. Diesel engine fuel filtration system.
4. Engine shall provide sufficient horsepower to operate all functions of the under bridge inspection aerial device and any accessories that it shall operate.

The auxiliary diesel engine shall be mounted so that it does not interfere with the operation of the under bridge inspection aerial device. If the auxiliary diesel engine is mounted under the truck platform bed then it shall be enclosed in a metal box that is constructed of minimum, 16-gauge steel. The box shall have removable lockable doors, have drain holes, be weather tight, and be painted inside and out. The box shall be of adequate size to provide access for maintenance of the auxiliary diesel engine. The box shall provide adequate ventilation to prevent overheating and ensure proper operation. Keys shall be provided.

G. CONTROLS AND SAFETY SYSTEM:

A master control station will be located at the pedestal and a control station at the work basket, and at the work platform. All movements of the under bridge inspection aerial device shall be controlled by low voltage electrical power, direct hydraulic power, or a properly balanced combination thereof. All controls must be equipped with two-way, return to neutral type levers. All control valves shall have proportional flow control and precise metering capability to provide smooth operation of the unit in all working positions and to insure the safety of operating personnel at all times.

Controls shall be arranged to allow for each individual movement separately or in any combination desired. Controls shall be located to facilitate maintenance access. Engine stop shall be provided at the bucket control station to shut down the operation in an emergency. The master control station shall maintain complete override capability of the work basket/work platform control station. The unit shall be equipped with a set of radio controls (either an additional set or a removable set). The controls (if independent) and control cord shall be stored in a special weatherproof and lockable compartment for easy access.



The unit shall have the following safety devices:

1. Interlock to prevent operation of under bridge inspection unit if suspension lockouts are not engaged.
2. Limit switches to prevent rotation or articulation of booms into unstable positions.
3. Relief valves and switches to prevent overloading hydraulic system with excessive pressures.
4. Emergency kill switches at the basket for truck and auxiliary engines.
5. Automatic check valves on hydraulic cylinders in case of pump or hose failure.
6. Automatic audible alarm to signal excessive slope conditions.
7. Engine shutdown system when low oil pressures, loss of coolant, or overheating develops.

H. TRUCK STABILIZERS:

To increase the safety and stability of the under bridge inspection unit, the unit shall have a counterweight.

The frame shall be equipped with four (4) hydraulically operated suspension lockouts, two at the front axle and two at the rear axle, controlled from the pedestal station. The lockout system shall include indicator lights to alert the operator that the lockouts are engaged or disengaged. Lights shall be installed in the cab and at the pedestal indicating whether each lockout is engaged or disengaged.

An interlock shall be installed to prevent operation of the under bridge inspection unit when the suspension lockout system is disengaged. A manual override (to allow booms to be stowed in case of system malfunction) shall be installed at the pedestal.

When lockouts are engaged, the truck shall be capable of withstanding all tipping forces generated by booms in all positions in both stationary and moving applications. Outriggers are unacceptable.

I. COMMUNICATION SYSTEM:



A fully transistorized intercommunication system mounted in the cab, at the pedestal, and at the underbridge work station all powered by the regular truck 12 volt electric system. The units at the cab and pedestal control station shall be a push to transmit and a continuous receiving unit. A continuous open system shall be mounted to the underbridge work station (a talk or listen without operating any switches). All components exposed to the weather shall be fully weatherproofed.

J. ACCESSORIES:

A minimum 185 CFM, 150 psi, rotary screw type air compressor, such as the VanAir 185 or equivalent shall be provided. The unit shall include a minimum 30-gallon capacity ASME stamped air receiver tank(s) with safety valve, condensation drain, pressure gauge and globe valve. The air compressor shall be turned on and off from a switch located on the pedestal/mainframe. The tank(s) and compressor shall be accessible and should be mounted under the truck platform bed in a metal box with necessary air/fluid receiver, fluid cooler and other equipment required for the air compressor to operate properly. All filters, drains, and valves shall be easily accessible.

A ¾" I.D. airline with a minimum working pressure rating higher than the air compressor shall be provided to the work basket. The airline shall be routed along the booms in protected areas and shall terminate at the work basket with a quick disconnect coupling. A quick disconnect coupling shall also be provided at the rear of the truck for use at the ground.

Four (4) 115 volt, three (3) contact, weatherproof, grounding, receptacles shall be provided, 2 at the bucket and 2 at the truck platform. Receptacles shall be ground fault interruption protected. On the work platform, there shall be one receptacle at each end, and two in the middle.

The under bridge inspection unit shall be equipped with an AC generator, minimum 60 hz and 7.5 kw, that will be driven by the power take off or the auxiliary diesel engine. The bidder shall determine the generator type and size. The size of the generator shall be sufficient for the proper operation of the heaters and the electrical outlets. The generator shall be turned on and off from a switch located on the pedestal/mainframe. **The generator shall be accessible and should be mounted under the truck platform bed in a metal box as described below.**

The air compressor/generator that is mounted on the underside of the truck platform bed shall be enclosed in metal box(s) that are constructed from a minimum 16-gauge steel. Box(s) shall have lockable doors, have drain holes, be as weather tight as possible, and be painted inside and out. The box(s) shall be of adequate size to provide access for maintenance of the air compressor/generator. The box(s) shall provide adequate ventilation to prevent overheating and ensure proper operation. Keys shall be provided.



The inspection basket shall be equipped with two (2) 1500 watt, 5000 BtuH, 115 volt, 60 Hz heaters with blower fans for the convenience of the workers during cold weather operations.

The workbasket will be equipped with two (2) swivel mounted detachable 12-volt flood lamps.

K. LABELS:

All controls, switches, lights and indicators shall be permanently labeled as to function and where applicable, direction of operations, using either engraved plastic or stamped/etched metal labels.

TRUCK CHASSIS & CAB:

The supplier shall furnish and include in the bid price a truck chassis-cab complete with all standard equipment and meeting the minimum enclosed Missouri Department of Transportation Specifications. Exceptions to these specifications will be allowed only upon approval from the General Services Department. The vehicle shall be a new-current model.

The acceptable cab and chassis manufacturers shall be International and Peterbuilt.

A. CHASSIS:

GVW shall be 66,000 pounds, minimum.

Wheelbase and cab to axle dimensions to be specified by the manufacturer to provide proper length and weight distribution and to be able to accommodate the under bridge inspection aerial device.

Frame: The minimum acceptable frame side rail shall meet or exceed the required section modulus of 37.68 cubic inches minimum, with 110,000-psi steel and an RBM of 4,145,000-inch pounds minimum. The under-bridge inspection aerial device manufacturer shall determine their actual units needs but meet the above minimums.

Front Axle: The front axle shall be 20,000 pounds, minimum capacity. The front suspension type shall be determined by the bidder and shall have a minimum capacity to match the front axle weight capacity.

Rear Axle: The rear axle shall be heavy-duty tandem 46,000 pounds, minimum capacity with a gear ratio to provide a top road speed of 70 MPH. The rear suspension type shall be determined by the bidder and shall have a minimum capacity to match the rear axle weight capacity. No aluminum walking beams.



Transmission: The transmission shall be an Allison 4500RDS, 6-speed automatic, or approved equal. Transmission shall be equipped with a temperature gauge and an overheating warning system.

PTO: The power take-off shall be transmission mounted power shift type, cab controlled, and shall have a ratio to provide optimum performance of the hydraulic pump operating upper structure components further described in the specs. Unit shall be equipped with a PTO engaged light.

B. CAB:

The unit shall consist of a standard conventional cab, standard front bumper with towing device, tinted glass all around, and a forward tilting fiberglass hood and fenders with a stone and gravel radiator guard.

Bostrom all vinyl trim foam cushioned seats for driver and one (1) passenger shall be provided. The driver and passenger seats shall be fully adjustable 915 High back air suspension seats. Seat belts with outboard retractors for the driver and passenger with LH and RH shoulder belts respectively shall also be provided.

The following shall be provided as a minimum:

1. Insulated headliner and back panel.
2. Cigar lighter and ashtray.
3. Dual padded sun visors.
4. Arm rests and door pulls for RH and LH.
5. AM-FM radio.
6. 2-speed electric with intermittent feature windshield wipers and windshield washer.
7. Dome light.
8. Floor mats.
9. Cab entry assist grab handles for RH and LH.
10. Two heated outside, West Coast mirrors, with bolt convex mirrors, for RH and LH.



11. Heater and defrost, heavy-duty fresh air type.
12. RH and LH steel step 50-gallon capacity fuel tanks, or LH 100-gallon capacity fuel tank.
13. Power steering.
14. Instrumentation shall include as a minimum: Fuel gauge, oil pressure gauge, temperature gauge, ammeter or voltmeter, air cleaning restriction indicator, tachometer, speedometer, low oil pressure warning lamp, and high temperature warning lamp.
15. Air conditioning.
16. Air horn.
17. Drip moldings, if available, over doors.
18. Stowage box on RH side of dash with door and latch.

C: ENGINE:

Engine to be diesel fueled, 13-liter, developing not less than 350 horsepower at rated RPM. Acceptable manufacturers shall be Caterpillar, Cummins, or approved equivalent.

Any required governors shall be determined and specified by the bidder.

Heavy-duty dry type air cleaner.

Oil filter and fuel filters as recommended by the engine manufacturer but including as a minimum a primary fuel filter between the fuel tank and engine and a secondary filter, and to include a fuel-water separator with heater or approved equal. All filters shall be easily accessible for maintenance.

Horizontal muffler with vertical tailpipe with bright shield to protect personnel from burns. Exhaust system shall not interfere with the operation of the body or under bridge inspection aerial device.

Low oil pressure and high water temperature alarm system.

Heavy duty extra cooling radiator with overflow recovery reservoir and permanent type anti-freeze installed to protect the vehicle to at least 35 degrees below zero.



Dual 600-watt electric engine block heater, 110 volt. Receptacle for attaching heater to outside power service shall be mounted on driver side of unit.

Alternator shall provide a minimum of 100-ampere capacity.

Three (3) 12-volt maintenance free batteries with at least 625 cold cranking amps each.

D. LIGHTS AND SIGNALS:

Standard with halogen headlights, combination tail and stop lights rear, side marker lights front, clearance lights, dome light and hazard warning flashers. Dual face front fender mounted turn signal lamps with reflectors and side markers. The unit shall have two (2) white/amber lens twin beam strobe lights incorporated at the rear bumper area. Headlights shall be able to be operated in either static or wigwag mode.

E. BRAKE SYSTEM:

Brakes shall be air actuated. The air compressor shall have a minimum capacity of 12 cubic feet. It is to have emergency air brake equipment, automatic moisture ejection system, low air pressure warning buzzer, dash mounted air pressure gauge, and a slack adjuster for each wheel. No accessories shall operate off the air brake system.

F. TIRES AND WHEELS:

Shall be provided by the manufacture that will support the equipment as stated in the above spec. The acceptable brands shall be Michelin, Bridgestone, Yokohama or Goodyear. The wheels shall be hub piloted disc.

The unit shall have four (4) anti-sail flaps, installed in the front and back of the rear tandem wheels. The flaps shall have a road clearance of ten (10) inches when the truck is empty. There shall be no advertising displayed on the flaps.

G. RUST PROOFING AND UNDERCOATING

Rust proofing of the vehicles shall include the following standards as a minimum:

1. Complete coverage of all inner surfaces requiring protection by means of properly atomized spray.
2. The material shall penetrate all seams and crevices.
3. Drain holes or passages shall not be blocked.



4. Exterior of vehicle shall be free of rust proofing compound except cracks, crevices and seams of decorative moldings.

Full undercoating shall be applied in a continuous and uniform thick coating, from 1/16" to 1/8" to all flatbed sheet metal except that the drive shafts, drain holes, lubrication points, engine crankcase, heavy castings and suspension components shall be kept free of coating material. Underside of body shall be completely coated.

G. TRUCK PLATFORM BED:

The truck platform bed shall be constructed of 1/4", minimum diamond plate steel. The truck platform bed shall be welded to a heavy-duty structural steel cross members and longitudinals with side and end rails. The truck platform bed surface shall be finished with non-skid paint.

The truck platform bed shall have two (2) locations with access steps/ladders installed, one on the driver's side and one on the rear. The steps/ladder shall be constructed of aluminum or steel with the first step being 15" to 18" from the ground. Grab handles shall be mounted to the top of the truck platform bed, they shall be maximum of 5 inches (5") tall and shall be able to accommodate an average worker's hand in a thick leather work glove. The handles and the step/ladders shall not interfere with the operation of the under bridge inspection aerial device.

A minimum of two (2) under the truck platform bed tool boxes shall be installed, one on the right side and one on the left side of the body. The boxes shall be constructed of 16 gauge steel as a minimum and be a minimum height of 24", depth of 24", and length of 60". The doors shall be downward opening with chain stops and locks. Doors shall have automotive neoprene d-type seals for weatherproofing. Boxes shall be painted inside and out. Drain holes shall be provided. Keys to the door locks shall be provided.

There should be no objects mounted to the truck platform bed other than the grab handles at the access areas and the necessary anchorage points to secure the under bridge inspection aerial device for transportation. **If items are to be mounted to the top of the truck platform bed they shall not interfere with the operation of the under bridge inspection unit off either side of the chassis and preferably on the drivers side of the platform bed.**

H. PAINT:

Exterior color to be federal standard #595b (colors used in Government Procurement "Highway Yellow" #13432 or equal.

GENERAL



The successful bidder will be required to furnish any safety and training videos and three (3) complete parts books, three (3) complete shop manuals and three (3) operators manuals for the under bridge inspection aerial device. The cost of these manuals shall be included in the bid price.

Manufacture shall provide onsite training for safety, maintenance, and operation of the under bridge inspection unit. The training shall be provided after acceptance on the under bridge inspection unit by the Missouri Department of Transportation and prior to being put into service. The cost for any training shall be included in the bid price.

Employees from the Missouri Department of Transportation shall be authorized to visit the plant at various times during the assembly of the specified under bridge inspection unit.

Any special tools required for preventive maintenance that can not be commercially purchased shall be provided with the under bridge inspection unit and be included in the bid price.

The Missouri Highway and Transportation Commission reserves the right to waive technicalities and to reject any or all bids and no bid is final until formally accepted by the Commission.