

CAPITAL IMPROVEMENT PROGRAM
City of Missoula CIP Project Request Form FY 2017-2021

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|----------------------------------|---------------------------|---------------------|---------------------|---------------------|
| Program Category: | Project Title: | 15 Project # | 16 Project # | 17 Project # |
| Parks, Recreation and Open Space | Grapple Truck Knuckleboom | | | PR-24 |

Description and justification of project and funding sources:
 The current boom on the grapple truck is a light-weight non-knuckle, extendable boom constructed for up and down lifts only. During tree removal work, logs of varying weights and densities are frequently lifted by the grapple. These lifts create rotational and lateral forces on the extendable boom. The boom was not designed for that type of loading. After the wind storm of August 10, 2015, the boom was being used to lift a tree off of a vehicle. The boom failed. This request will fund the purchase and installation of a replacement knuckleboom designed for tree work. The existing truck, grapple and grapple swivel will be reused. The alternative is to repair the existing boom on the grapple truck. This will cost approximately \$14,000. The existing repaired boom will be used until a new knuckleboom loader can be purchased.

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| Is this equipment prioritized on an equipment replacement schedule? | Yes | No | NA |
| | | | |
| Is there ongoing Operating and/or Maintenance costs upon completion of project? | Yes | No | NA |
| | x | | |

Are there any site requirements:
 N/A

| How is this project going to be funded: | | | | | | | | Funded in Prior Years |
|---|-----------------|--------|------|------|------|------|---|-----------------------|
| Funding Source | Accounting Code | FY17 | FY18 | FY19 | FY20 | FY21 | | |
| Park District (Lease) | | 46,000 | | | | | | |
| | | 46,000 | - | - | - | - | - | |

| How is this project going to be spent: | | | | | | | | Spent in Prior Years |
|--|-----------------|--------|------|------|------|------|---|----------------------|
| Budgeted Funds | Accounting Code | FY17 | FY18 | FY19 | FY20 | FY21 | | |
| A. Land Cost | | | | | | | | |
| B. Construction Cost | | | | | | | | |
| C. Contingencies (10% of B) | | | | | | | | |
| D. Design & Engineering (15% of B) | | | | | | | | |
| E. Percent for Art (1% of B) | | | | | | | | |
| F. Equipment Costs | | 46,000 | | | | | | |
| G. Other | | | | | | | | |
| | | 46,000 | - | - | - | - | - | |

| Does this project have any ongoing Operating and/or Maintenance cost to be included in the operating budget: <small>(account for operational savings and/or reduction in current budget of previous operating/maintenance charges)</small> | | | | | | | | Spent in Prior Years |
|---|-----------------|------|------|------|------|------|---|----------------------|
| Expense Object | Accounting Code | FY17 | FY18 | FY19 | FY20 | FY21 | | |
| Personnel | | | | | | | | |
| Supplies | | | | | | | | |
| Purchased Services | | | | | | | | |
| Fixed Charges | | | | | | | | |
| Capital Outlay | | | | | | | | |
| Debt Service | | | | | | | | |
| (Operational Savings) | | | | | | | | |
| | | - | - | - | - | - | - | |

Description of additional operating budget impact:
 Fuel and Maintenance Costs

| | | | | | |
|----------------------------|--------------------------------|----------------------------------|------------------------------|----------------------------|--------------------|
| Responsible Person: | Responsible Department: | Date Submitted to Finance | Today's Date and Time | Preparer's Initials | Total Score |
| Chris Boza | Parks | 3/25/2016 | 5/16/2016 11:39 | CB | 33 |

CAPITAL IMPROVEMENT PROGRAM

Project Rating

(See C.I.P. Instructions For Explanation of Criteria)

| Program Category: | Project Title: | | | | 17 Project # | |
|---|---------------------------|--------------------------|---|--|--------------|-------------|
| Parks, Recreation and Open Space | Grapple Truck Knuckleboom | | | | PR-24 | |
| Qualitative Analysis | | Yes | No | Comments | | |
| 1. Is the project necessary to meet federal, state, or local legal requirements? This criterion includes projects mandated by Court Order to meet requirements of law or other requirements. Of special concern is that the project be accessible to the handicapped. | | <input type="checkbox"/> | <input checked="" type="checkbox"/> | This piece of equipment will assist urban forestry crews in removing and disposing of high risk street trees. | | |
| 2. Is the project necessary to fulfill a contractual requirement? This criterion includes Federal or State grants which require local participation. Indicate the Grant name and number in the comment column. | | <input type="checkbox"/> | <input checked="" type="checkbox"/> | | | |
| 3. Is this project urgently required? Will delay result in curtailment of an essential service? This statement should be checked "Yes" only if an emergency is clearly indicated; otherwise, answer "No". If "Yes", be sure to give full justification. | | <input type="checkbox"/> | <input checked="" type="checkbox"/> | | | |
| 4. Does the project provide for and/or improve public health and/or public safety? This criterion should be answered "No" unless public health and/or safety can be shown to be an urgent or critical factor. | | <input type="checkbox"/> | <input checked="" type="checkbox"/> | There are over 24,400 street trees overhanging city streets. Trees being removed by city crews pose a high level of risk to public safety. | | |
| Quantitative Analysis | | Raw Score Range | Comments | | Weight | Total Score |
| 5. Does the project result in maximum benefit to the community from the investment dollar? | | 2 | Yes, High risk trees pose a threat of damage , injury or death. Removal and disposal of debris is critical for urban forest risk management. | | 5 | 10 |
| 6. Does the project require speedy implementation in order to assure its maximum effectiveness? | | 2 | Yes. Logs from tree removal operations are now bucked up into smaller pieces that can be lifted by staff. This is time consuming and increases the potential for worker's comp claims. | | 4 | 8 |
| 7. Does the project conserve energy, cultural or natural resources, or reduce pollution? | | 1 | Yes. Chainsaws are used to cut the logs into smaller pieces. The exhaust from the chainsaws is a greater pollutant than the grapple truck. | | 3 | 3 |
| 8. Does the project improve or expand upon essential City services where such services are recognized and accepted as being necessary and effective? | | 1 | Removal of dead, dying, diseased and structurally unsound trees benefits the city residents by eliminating risk of damage, injury or death. Residents like to walk down streets without fear of being crushed by an unsound tree. | | 4 | 4 |
| 9. Does the project specifically relate to the City's strategic planning priorities or other plans? | | 2 | Managing and maintaining the urban forest is consistent with the city's Urban Forest Management Plan. A functioning grapple truck is needed remove failing trees in a timely manner. In order to achieve the priorities of plan, staff needs the tools to prune and maintain Missoula street trees. | | 4 | 8 |
| Total Score | | | | | 33 | |

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Support Document for Knuckleboom Log Grapple Boom

The current boom on the grapple truck is a National Crane N-50 light-weight non-knuckleboom, extendable boom constructed for up and down lifts only. The extensions work through a series of cables that move each section of the boom in and out through hollow tubes. These sections slide in and out on a series of nylon bushings. Each section of boom extension becomes progressively smaller to fit inside of the previous boom section. The end result is a grapple connection point that is just a fraction of the initial boom section. Photographs of the N-50 construction are shown below.



During tree removal work, logs of varying weights and densities are frequently lifted by the grapple. These lifts create rotational and lateral forces on the extendable boom section. Large logs located away from the truck are sometimes moved by partially dragging the log. At full extension of 40 feet, the N-50 has a capacity of 700 lbs. At mid-extension of 20 feet, the N-50 has a capacity of 1,600 lbs. The grapple attached to the boom weighs 800 lbs. The N-50 boom was not designed for the type of loading and weights typical of tree removal operations. The N-50 was designed for vertical lifts of balanced loads.

Note the grapple in the photo above. The grapple is designed to rotate in a continuous 360 degree motion. The grapple swivel is designed to move in two directions. The N-50 boom is not designed for this type of application. According to maintenance records, the boom has failed twice and the nylon bushings have failed five times due to lateral and rotational loading.

After the wind storm of August 10, 2015, the N-50 boom with grapple was at mid-extension and being used to lift a tree off of a vehicle. The outer N-50 boom section and nylon bushings failed under a lateral load of approximately 1,400 lbs, which included both the grapple and the log. The cost to repair the existing boom is \$14,770.

This request will fund the purchase and installation of a replacement knuckleboom designed for tree work where lateral loading is expected. The replacement boom will be non-extendable with a side reach of 21 feet and a capacity of 1,940 lbs at full extension and a 15 foot side-reach capacity of 6,620 lbs. Barko, Prentiss and Palfinger all manufacture units that meet these capacities. A photograph of a Barko 80XL knuckleboom grapple boom in use is shown below. A photograph of a similar, but much larger capacity, Barko 130 B knuckleboom log grapple is also shown below.



The cost of purchasing and installing a Barko 80XL knuckleboom would be approximately \$46,000. The existing truck, No. 220, grapple and grapple swivel are serviceable and will be reused.