**Problem Statement:** A transportation system must be developed to safely and cost-effectively move the carillon model with a limited number of people.

**Customer Requirements**
- Safety of those operating
- No use of heavy equipment
- 2-person operation
- Fits through double doors
- Lasts for many years (durable)
- Ease of assembly
- Affordable
- Will not damage the carillon
- Truck must accommodate the carillon

**Design Goals**
- Carriage able to support carillon weight
- Power mover able to travel up 5% incline
- Able to maneuver through double doors
- Automatic safety braking
- Compatible with Façade
- Design accommodated to a vehicle available to ISU

**Transport Instructions**
1. Place main wheel units on the carillon frame, insert shearing pin on side wheels
2. Screw in lifting anchor bolts on side wheels
3. Attach hitch unit
4. Place Power Mover so post hitch ball is directly under hitch coupler
5. Unscrew leveling legs with impact wrench
7. Turn on power mover
8. Lower lift gate
9. Carefully move carillon section with Power Mover Roll onto lift gate platform making sure to stay safely away from platform edges.
10. Lower levelling legs to secure carillon section on lift gate.
11. Raise lift gate
12. Raise levelling legs
13. Roll into truck and secure unit by lowering leveling legs
14. Disengage Power Mover hitch lock and detach power mover
15. Repeat process for other carillon sections

**Final Design**

**Exploded View**

**Design Strategies**
- Minimal components
- Intuitive installation
- No loose components
- Safe Operation
- Ergonomic Design
- Eliminate interference with the bells

**Analysis**

<table>
<thead>
<tr>
<th>Issue</th>
<th>Pull</th>
<th>Push</th>
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<tbody>
<tr>
<td>Gradeability</td>
<td>Center</td>
<td>6.6%</td>
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<tr>
<td></td>
<td>Side</td>
<td>12%</td>
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<tr>
<td>Drive Force Required (lbf)</td>
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<tr>
<td></td>
<td>Side</td>
<td>128.7</td>
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<td>Tongue Weight FOS*</td>
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<td></td>
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<tr>
<td>Wheel Capacity FOS</td>
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<tr>
<td></td>
<td>Side</td>
<td>6.068</td>
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<tr>
<td>Max Step</td>
<td>Center</td>
<td>1 inch</td>
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*Factor of Safety