Development of Campus Parking Model

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UNDER THE DIRECTION OF DR. JAY GROSSMAN
Abstract

➢ Goal: Optimize parking on Valparaiso University’s campus
➢ Determine: Parking lot occupancy & building usage
➢ Data segregated by:
  ➢ Parking Class (Commuter/Faculty)
  ➢ Building Usage (Number of Students in Building for Class)
➢ Video Data Collection used to track parking usage throughout the day
Data Collection

Parking Counts

➢ Lots analyzed: Lots 1, 2, 3, & 5
➢ When: Tuesday, October 22, 2019 & Wednesday, October 23, 2019
➢ Times: Morning, Mid-day, & Afternoon

Faculty
Commuter
Building Usage

- **Buildings Analyzed:** GEM/Fites, Meier Hall, & Urschel Hall
- **Data:** Number of students in class throughout the day
- **Days:** Tuesday & Wednesday
- **Goal:** Make correlation with parking usage
Video Data Collection

➢ VUCA Handicap Lot
➢ When: November 18\textsuperscript{th} – 22\textsuperscript{nd}, 2019
➢ Data Collected:
  ➢ Occupancy throughout each day
  ➢ Average time parked
Lot 1 - Faculty

Percent Maximum Occupancy

Tuesday: 84%
Wednesday: 81%

<table>
<thead>
<tr>
<th>Time</th>
<th>Tuesday Occupied Spaces</th>
<th>Total Spaces</th>
<th>Wednesday Occupied Spaces</th>
<th>Total Spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 AM</td>
<td>0</td>
<td>168</td>
<td>7:00 AM</td>
<td>0</td>
</tr>
<tr>
<td>7:45 AM</td>
<td>74</td>
<td>168</td>
<td>7:45 AM</td>
<td>58</td>
</tr>
<tr>
<td>10:00 AM</td>
<td>109</td>
<td>168</td>
<td>10:00 AM</td>
<td>136</td>
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<tr>
<td>12:30 PM</td>
<td>116</td>
<td>168</td>
<td>12:30 PM</td>
<td>118</td>
</tr>
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<td>141</td>
<td>168</td>
<td>2:30 PM</td>
<td>108</td>
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<td>4:30 PM</td>
<td>87</td>
<td>168</td>
<td>4:30 PM</td>
<td>89</td>
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<tr>
<td>5:00 PM</td>
<td>0</td>
<td>168</td>
<td>5:00 PM</td>
<td>0</td>
</tr>
</tbody>
</table>
Lot 2 – Commuter

Percent Maximum Occupancy

Tuesday: 93%
Wednesday: 100%

<table>
<thead>
<tr>
<th>Time</th>
<th>Occupied Spaces</th>
<th>Total Spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 AM</td>
<td>0</td>
<td>112</td>
</tr>
<tr>
<td>7:45 AM</td>
<td>8</td>
<td>112</td>
</tr>
<tr>
<td>10:00 AM</td>
<td>48</td>
<td>112</td>
</tr>
<tr>
<td>12:30 PM</td>
<td>104</td>
<td>112</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>93</td>
<td>112</td>
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<tr>
<td>4:30 PM</td>
<td>49</td>
<td>112</td>
</tr>
<tr>
<td>5:00 PM</td>
<td>0</td>
<td>112</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Occupied Spaces</th>
<th>Total Spaces</th>
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</thead>
<tbody>
<tr>
<td>7:00 AM</td>
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<td>112</td>
</tr>
<tr>
<td>7:45 AM</td>
<td>18</td>
<td>112</td>
</tr>
<tr>
<td>10:00 AM</td>
<td>112</td>
<td>112</td>
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<tr>
<td>12:30 PM</td>
<td>104</td>
<td>112</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>96</td>
<td>112</td>
</tr>
<tr>
<td>4:30 PM</td>
<td>31</td>
<td>112</td>
</tr>
<tr>
<td>5:00 PM</td>
<td>0</td>
<td>112</td>
</tr>
</tbody>
</table>
Lot 3 – Faculty & Faculty/Commuter

Faculty: Percent Maximum Occupancy
Tuesday: 100%
Wednesday: 100%

Faculty/Commuter: Percent Maximum Occupancy
Tuesday: 100%
Wednesday: 84%
Lot 5 – Faculty & Commuter

Faculty: Percent Maximum Occupancy
Tuesday: 92%
Wednesday: 97%

Commuter: Percent Maximum Occupancy
Tuesday: 100%
Wednesday: 100%
GEM/Fites with Lot 2 & 3 - Tuesday

GEM/Fites Comparison - TUES

- GEM/FITES Building
- Lot 2-FITES COMMUTER
- Lot 3-GEM Faculty/Commuter

Time:
- 6:00 AM
- 7:45 AM
- 10:00 AM
- 12:30 PM
- 2:30 PM
- 4:30 PM
- 8:00 PM

Students in Class
- 0
- 50
- 100
- 150
- 200
- 250
- 300
- 350
- 400
- 450
- 500

Occupied Parking Spaces
- 0
- 20
- 40
- 60
- 80
- 100
- 120

Bar Chart:
- GEM/FITES Building
- Lot 2-FITES COMMUTER
- Lot 3-GEM Faculty/Commuter
GEM/Fites with Lot 2 & 3 - Wednesday

GEM/FITES Comparison - WED

Students in Class

Occupied Parking Spaces

Time

GEM/FITES Building
Lot 2 - FITES Commuter
Lot 3 - GEM Faculty/Commuter
Meier Hall with Lot 2 & 3 - Tuesday

Meier Hall Comparison - TUES

- MEIER Building
- Lot 2 - FITES
- Commuter
- Lot 3 - GEM
- Faculty/Commuter

Students in Class vs. Occupied Parking Spaces over Time:

- 6:00 AM - 10:00 AM: MEIER Building peak (220 students)
- 10:00 AM - 12:30 PM: Lot 2 and Lot 3 peak
- 12:30 PM - 2:30 PM: MEIER Building peak again (180 students)
- 2:30 PM - 4:30 PM: Lot 2 and Lot 3 decline
- 4:30 PM - 8:00 PM: MEIER Building and Lot 2 and Lot 3 decline further

Time:
- 6:00 AM
- 7:45 AM
- 10:00 AM
- 12:30 PM
- 2:30 PM
- 4:30 PM
- 8:00 PM

Students in Class:
- 0
- 50
- 100
- 150
- 200

Occupied Parking Spaces:
- 0
- 20
- 40
- 60
- 80
- 100
- 120
Urschel Hall with Lot 3 & 5 - Wednesday
Table 9. Daily Parking Data.

<table>
<thead>
<tr>
<th>Day</th>
<th>Vehicles Per Day</th>
<th>Total Time Parked Per Day (Hours)</th>
<th>Average Time Parked Per Vehicle (Hours)</th>
<th>Maximum Occupancy (Vehicles)</th>
<th>Time of Maximum Occupancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>8</td>
<td>23.6</td>
<td>2.95</td>
<td>4</td>
<td>12:20 PM</td>
</tr>
<tr>
<td>Tuesday</td>
<td>12</td>
<td>28.5</td>
<td>2.38</td>
<td>8</td>
<td>7:00 PM</td>
</tr>
<tr>
<td>Wednesday</td>
<td>13</td>
<td>24.3</td>
<td>1.87</td>
<td>7</td>
<td>7:00 PM</td>
</tr>
<tr>
<td>Thursday</td>
<td>15</td>
<td>23.5</td>
<td>1.57</td>
<td>6</td>
<td>3:20 PM</td>
</tr>
<tr>
<td>Friday</td>
<td>5</td>
<td>3</td>
<td>0.60</td>
<td>3</td>
<td>11:30 PM</td>
</tr>
</tbody>
</table>

Table 10. Weekly Parking Data.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Vehicles</td>
<td>53</td>
</tr>
<tr>
<td>Total Hours Parked</td>
<td>102.9</td>
</tr>
<tr>
<td>Average Maximum Occupancy (Vehicles)</td>
<td>5.6</td>
</tr>
<tr>
<td>Average Time Parked (Hours)</td>
<td>1.94</td>
</tr>
</tbody>
</table>
Overall Results

- Lots 2, 3 (faculty), and 5 (commuter) have capacity concerns
- Lots 2 & 3 show strong correlations with student building occupancy
- Handicapped Lot has no serious concerns
Possible Solutions

➢ Designate spaces from Lot 1 as Commuter Parking

➢ Create additional parking in the Scholarship Plaza area

➢ Expand Lot 5 into area between Wehrenberg Hall & Urschel Hall
Thank You!

Questions?