University of Massachusetts Amherst

M&I-ENG 670-Technical Project Management

Prof.Nehal Patel

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Group - 3

"Proposal For Redesigning Of Parking Lot 12" (in UMass)

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Presentation Outline

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The Problem

Problem

The number of vehicles is continually increasing, leading to parking-related issues. Specifically, Parking Lot 12 at UMass faces significant parking problems. People are unable to park their vehicles properly within the available space, mainly due to poor infrastructure.

Our Solution

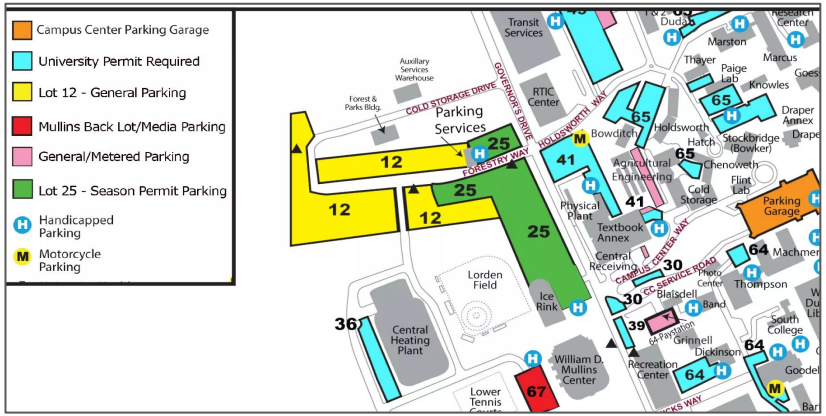
We aim to use advanced technology to develop an automated parking system. This will include proper leveling through paving and surfacing, along with designing an efficient parking layout. Our focus will also be on managing traffic flow, implementing access controls, and making the space environmentally friendly by adding landscaping, greenery, sufficient lighting, and EV charging stations to encourage the use of electric vehicles and support environmental sustainability.

Project Scope

The primary objective of the Lot 12 Parking Redesign Project is to transform the existing dirt parking lot into a more structured, organised and efficient space for UMass students and faculty.

Main improvements include-

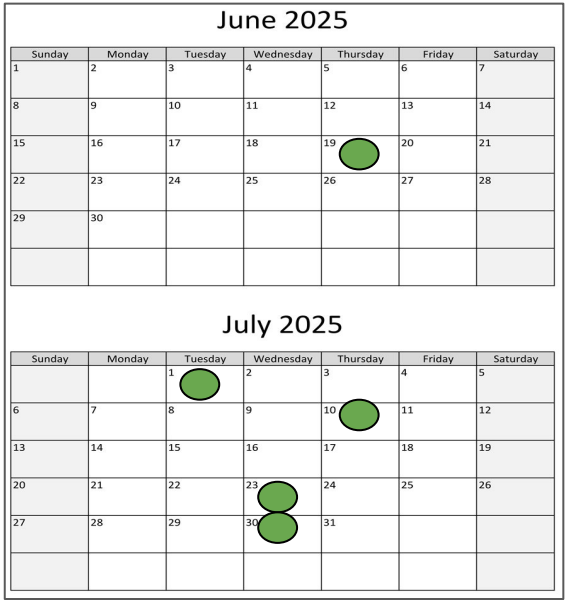
- Paved surface with marked parking spots
- Clear traffic lanes
- QR code scanner at entrance
- Better organised space to prevent messy parking



The goal is to help students and faculty to park more easily and fit more cars properly in the messy parking. To mitigate issues related to over - parking and triple parking in traffic management, ensuring that parking space is utilized to its maximum capacity.

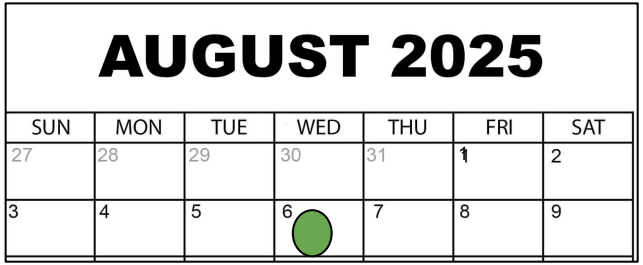
Project Overview

June 2nd, 2025 - August 12th, 2025
(51 working days)



Deliverables / Key Milestone Dates:

1. Concrete Surfacing - June 19
2. Painted Parking Spaces - July 01
3. Signage + Traffic Barriers - July 10
4. Access Gate Operation - July 23
5. Greenery - July 30
6. Lighting Fixtures - August 06
7. EV Charging Stations - August 12



Top Project Risks:

1. Concrete Curing Issues
2. Gate Control Failure

Total Budget: ~$2.5m (including contingencies)

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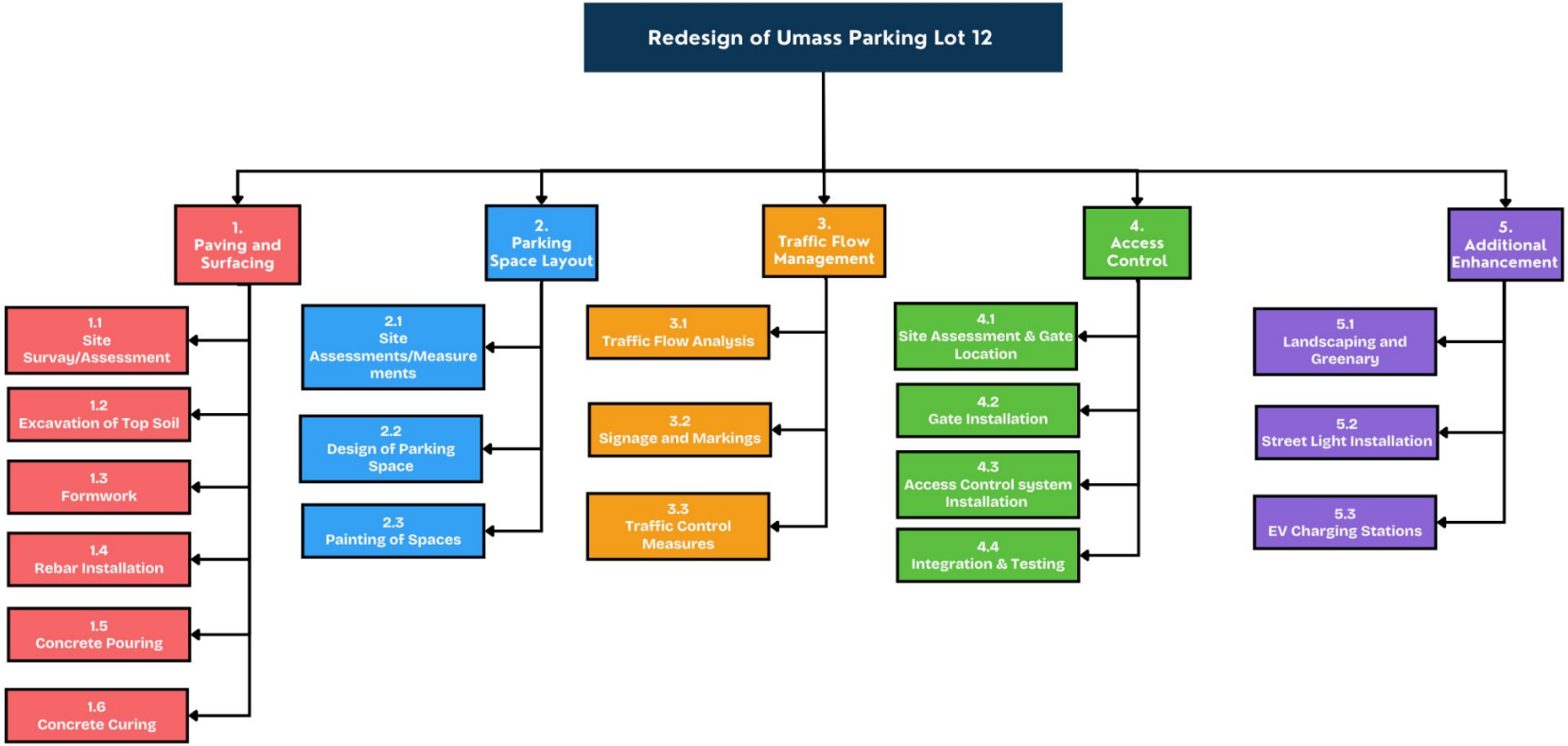
Work Breakdown Structure



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Work Breakdown Structure

1. Paving and Surfacing : This phase ensures the foundation of the parking lot is durable and long-lasting. Activities include site surveys, excavation, rebar installation, and concrete pouring, followed by proper curing for stability.

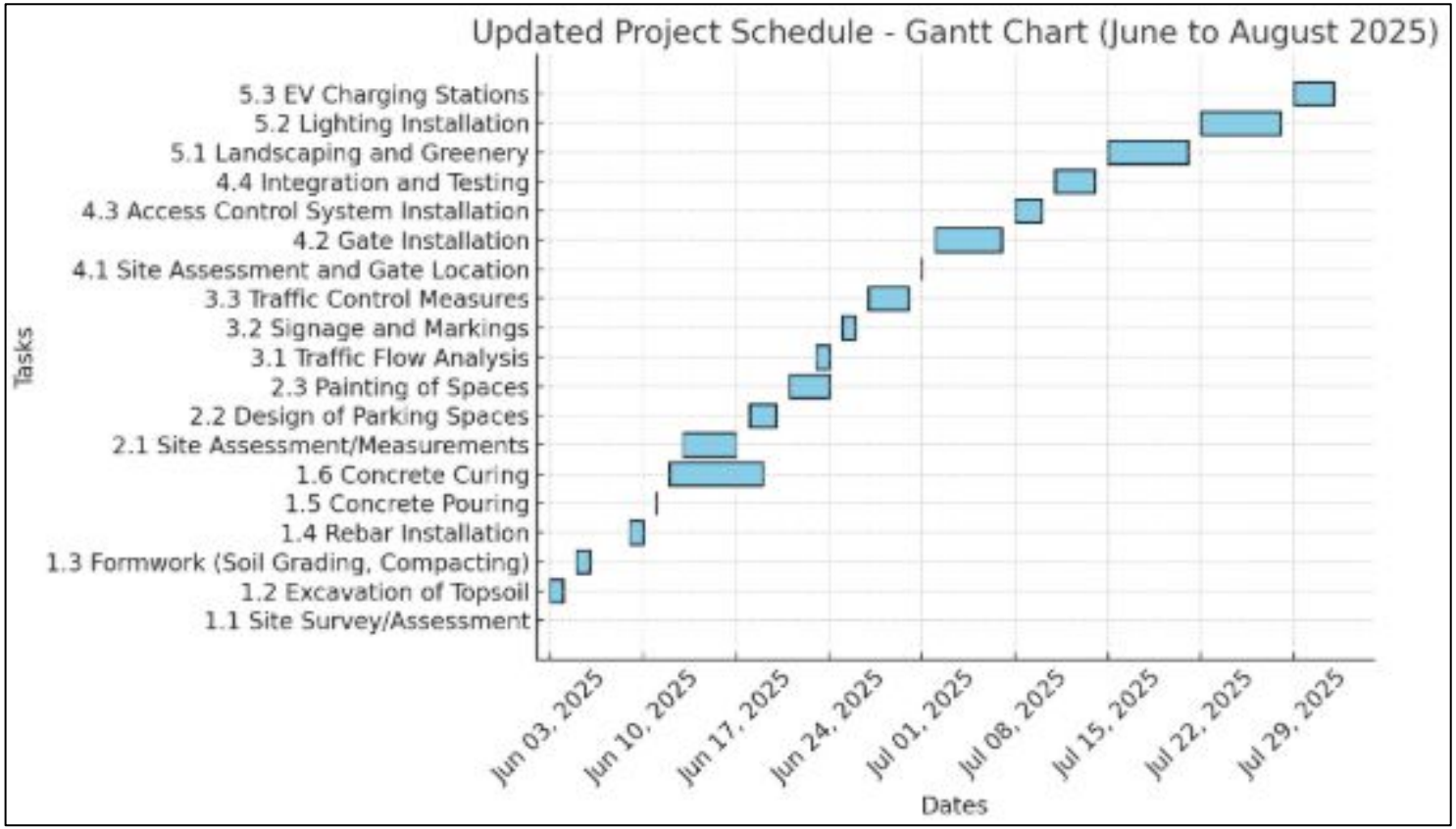
2. Parking Space Layout : Efficient space utilization is achieved by measuring and designing parking spots. Clear marking and painting of spaces ensure organized and accessible parking for all users.

3. Traffic Flow Management : Analyzing traffic patterns helps design smooth entry and exit routes. Traffic control measures and proper signage enhance safety and prevent congestion.

4. Access Control : Gate systems are installed with advanced access control technologies like QR codes. Site assessments, system integration to the database, and rigorous testing ensure seamless operation.

5. Additional Enhancements : Landscaping and greenery create an aesthetic environment, while streetlights improve nighttime visibility. EV charging stations are added to support sustainable and modern needs.

Schedule to Implement



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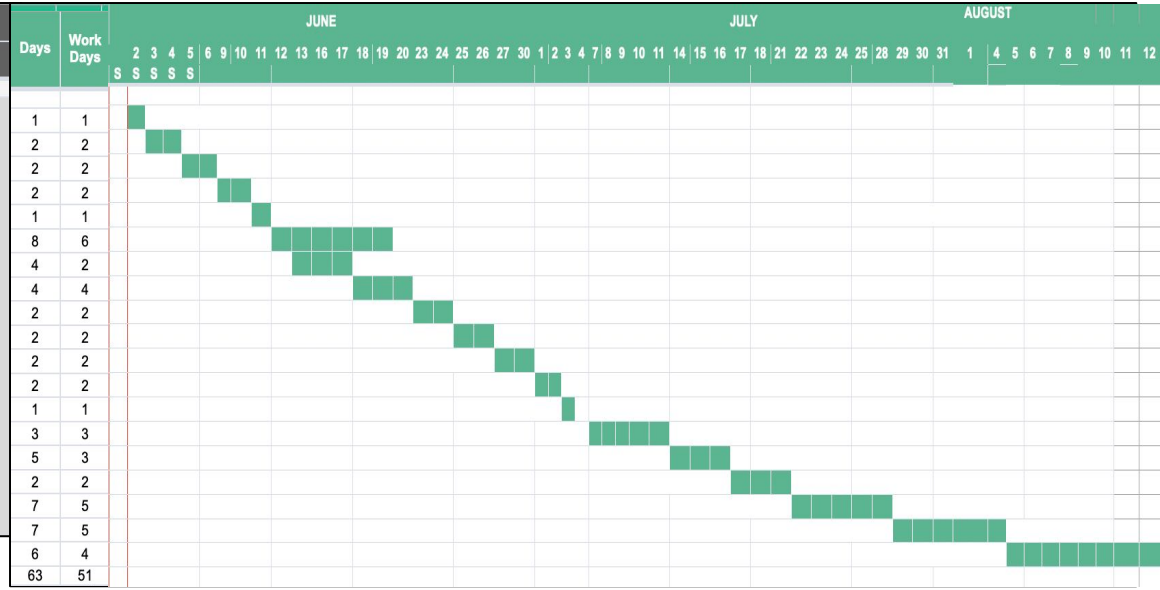
Detailed Schedule

WP	ID	Tasks	Start	End	Person	Days	Work Days
1	1	1.1 Site Survey/Assessment	2/Jun/25	2/Jun/25	Civil Engineer	1	1
	2	1.2 Excavation of Topsoil	3/Jun/25	4/Jun/25	Civil Engineer	2	2
	3	1.3 Formwork	5/Jun/25	6/Jun/25	Civil Engineer	2	2
	4	1.4 Rebar Installation	9/Jun/25	10/Jun/25	Civil Engineer	2	2
	5	1.5 Concrete Pouring	11/Jun/25	11/Jun/24	Civil Engineer	1	1
	6	1.6 Concrete Curing	12/Jun/25	19/Jun/25	Civil Engineer	8	6
2	7	2.1 Site Assessment/Measurements	20/Jun/25	23/Jun/25	Designer	4	2
	8	2.2 Design of Parking Spaces	24/Jun/25	27/Jun/25	Designer	4	4
	9	2.3 Painting of Spaces	30/Jun/25	1/Jul/25	Designer	2	2
3	10	3.1 Traffic Flow Analysis	2/Jul/25	3/Jul/25	Traffic Engineer	2	2
	11	3.2 Signage and Markings	7/Jul/25	8/Jul/25	Traffic Engineer	2	2
	12	3.3 Traffic Control Measures	9/Jul/25	10/Jul/25	Traffic Engineer	2	2
4	13	4.1 Site Assessment and Gate Location	11/Jul/25	11/Jul/25	Software Engineer	1	1
	14	4.2 Gate Installation	14/Jul/25	16/Jul/25	Software Engineer	3	3
	15	4.3 Access Control System Installation	17/Jul/25	21/Jul/25	Software Engineer	5	3
	16	4.4 Integration and Testing	22/Jul/25	23/Jul/25	Software Engineer	2	2
5	17	5.1 Landscaping and Greenery	24/Jul/25	30/Jul/25	Electrical Engineer	7	5
	18	5.2 Lighting Installation	31/Jul/25	6/Aug/25	Electrical Engineer	7	5
	19	5.3 EV Charging Stations	7/Aug/25	12/Aug/25	Electrical Engineer	6	4
						63	51



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Risk Identification / Mitigation of Cost, Performance

Risk ID	Work Package	Risk	Cause	Effect	Consequence	Likelihood
1	Paving and Surfacing	Inaccurate site data	Incorrect measurements during survey	Misaligned excavation and layout	High	Medium
2		Delays in excavation	Unexpected rocks or old infrastructure	Increased project timeline	Medium	Medium
3		Poor soil compaction	Inadequate grading or compaction	Surface instability, risk of cracks	High	Medium
4		Rebar installation issues	Material delays or incorrect placement	Reduced structural strength	High	Low
5		Concrete curing issues	Bad weather during curing	Weak concrete, affecting durability	High	High
6	Parking Space Layout	Measurement errors	Miscalculations in space dimensions	Reduced parking capacity	Medium	Medium
7		Poor layout design	Ineffective design process	Traffic congestion	Medium	Medium
8		Paint drying delays	Weather (rain or high humidity)	Delay in finishing spaces	Low	High
9	Traffic Flow Management	Inaccurate traffic analysis	Insufficient data on traffic patterns	Congestion within parking area	Medium	Low
10		Poor signage placement	Lack of clear signage placement standards	Driver confusion, unsafe conditions	Medium	Medium
11		Insufficient traffic control	Not enough traffic barriers or signals	Increased risk of accidents	High	Low
12	Access Control	Gate placement issues	Poor gate location selection	Traffic bottlenecks	Medium	Medium
13		Gate malfunction	Software or mechanical issues	Delays and potential security risks	High	Medium
15	Additional Enhancements	Landscaping problems	Wrong plant selection or poor soil quality	Dead plants, reduced aesthetic value	Low	Medium
16		Insufficient lighting coverage	Poor lighting design or placement	Reduced visibility, lower security	Medium	Medium
17		EV charging station issues	Electrical supply problems or equipment faults	Inconvenience for users	Medium	Low

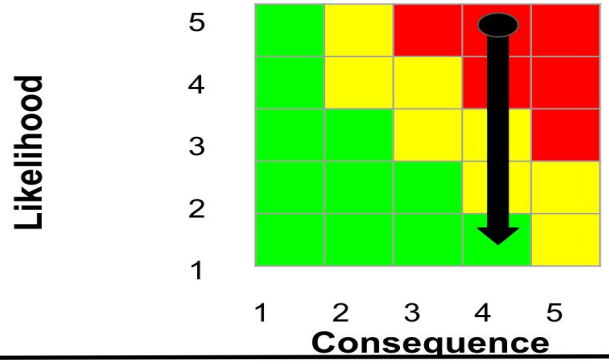
Risk Management

Risk 5: Concrete curing issues

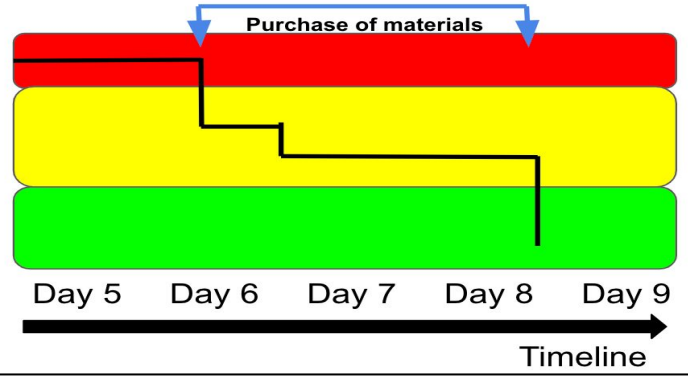
Root Cause

- Poor weather (rain, snow, low temps, high temps, wind) will not let concrete cure properly

If bad weather occurs during the curing period, ***then*** the concrete may not cure properly, leading to issues such as cracking, weakened strength, and a compromised surface finish which will delay the project by at least a week.



Step	Mitigation Action	Date	Likelihood, Consequence
1	Ensure the weather for the upcoming week is relatively stable	Day 5 (June 5th)	L5(High), C4(High)
2	Purchase additional materials to assist proper curing (tarps, sheets, heaters, moisture distribution)	Day 6 - Day 8 (June 6th-June 8th)	L4 (Med), C4(High)
3	Have a plan for unexpected weather changes and utilize resources available to ensure proper curing	Day 8 - Day 9 (June 8th-June 9th)	L3(Low), C4 (High)



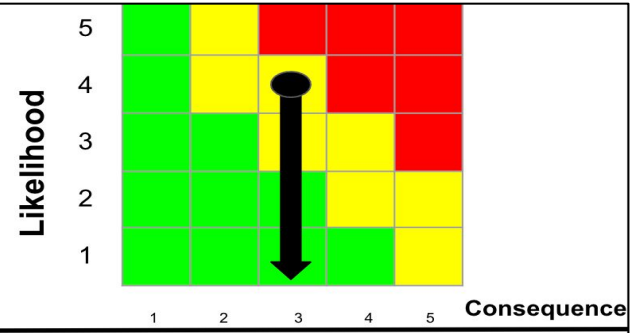
Risk Management

Risk 13: Gate control failure

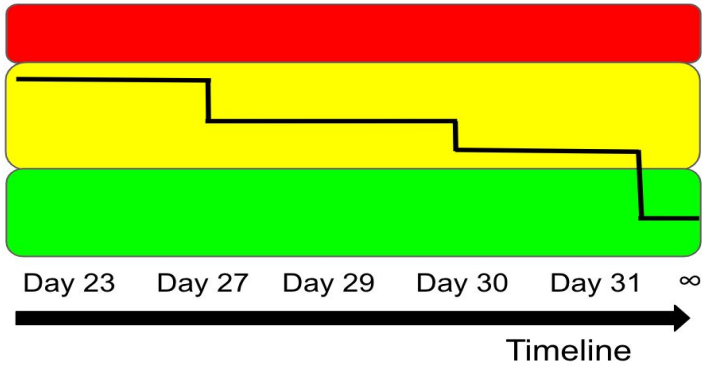
Root Cause

- Software malfunctioning to not open parking gate to vehicles with a parking pass

If the access control gate software malfunctions to not let in vehicles with a parking pass, ***then*** vehicles will not be able to enter the lot as the gate remains down



Step	Mitigation Action	Date	Likelihood, Consequence
1	Collaborate with software engineers to create a program for the gate to open when a pass is scanned.	Day 23 - Day 29 (June 25th -June 30th	L4(High), C3(Med)
2	Establish a backup protocol as a failsafe in case the main program malfunctions. (i.e a manually entered override code for passholders)	Day 27 - Day 29 (June 28 th-June 30th)	L3((Med), C3(Med)
3	Perform system integration and testing.	Day 30 - Day 31 (July 2nd- July 3rd)	L2(Med), C3(Med)
4	Perform regular system updates on software, and schedule maintenance checks regularly	Indefinitely	L1(Low), C3(Med)



Risk Identification and Mitigation Plan

Risk Identification	Mitigation Plan
Inaccurate site data	Use high-precision survey equipment and cross-verify with multiple sources
Delays in excavation	Perform soil tests and use suitable machinery for unexpected conditions
Poor soil compaction	Conduct compaction tests post-grading to ensure stability
Rebar installation issues	Schedule material delivery in advance and assign experienced labor
Concrete curing issues	Schedule curing during stable weather or use covers if unexpected changes occur
Measurement errors	Use design software and verify with multiple stakeholders
Poor layout design	Optimize layout with simulation and user feedback
Paint drying delays	Use quick-dry paint and plan around stable weather

Risk Identification	Mitigation Plan
Inaccurate traffic analysis	Conduct traffic flow analysis during peak and non-peak times
Poor signage placement	Follow standard placement protocols and ensure clear markings
Insufficient traffic control	Add extra control devices like cones and barriers as needed
Gate placement issues	Optimize gate placement based on flow analysis
Gate malfunction	Perform installation checks and schedule regular maintenance. Have backup protocols (like an override code for pass holders) and perform regular system updates
Landscaping problems	Use native plants and improve soil quality if needed
Insufficient lighting coverage	Install additional lighting as needed based on night inspections
EV charging station issues	Test stations regularly and perform maintenance checks

Cost Breakdown Structure

Work Breakdown	Duration (Days)	Cost of Labor ($)	Cost of Materials ($)	Cost of Equipment ($)	Total Cost ($)
1. Paving and Surfacing					**2,119,250.00**
1.1 Site Survey/Assessment	1	1,200	0	150	1,350.00
1.2 Excavation of Top Soil	2	2,100	0	2400	4,500.00
1.3 Formwork	2	2,100	1500	600	4,200.00
1.4 Rebar Installation	2	2,400	2000	200	4,600.00
1.5 Concrete Pouring	1	3,000	2,100,000	800	2,103,800.00
1.6 Concrete Curing	7	0	800	0	800.00
2. Parking Space Layout					**16,600.00**
2.1 Site Measurement/Assessments	2	0	0	0	0
2.2 Design of Parking Spaces	3	3000	0	500	3,500.00
2.3 Painting of Spaces	2	3300	9300	500	13,100.00
3. Traffic Flow Management					**14,100.00**
3.1 Traffic Flow Analysis	2	2400	0	500	2,900.00
3.2 Signage and Markings	2	2800	1700	900	5,400.00
3.3 Traffic Control Measures	2	2800	1200	1800	5,800.00
4. Access Control					**46,800.00**
4.1 Site Assessment and Gate Location	1	0	0	0	0
4.2 Gate Installation	5	7600	12000	1000	20,600.00
4.3 Access Control System Installation	3	9600	0	10000	19,600.00
4.4 Integration and Testing	3	6600	0	0	6,600.00
5. Additional Enhancements					**73,500.00**
5.1 Landscape and Greenery	5	7500	6500	500	14,500.00
5.2 Lighting Installation	5	6000	18000	3500	27,500.00
5.3 EV Charging Stations	4	6000	22000	3500	31,500.00
				Total Cost:	**2,270,250.00**

Cost Breakdown Assumptions and Contingencies

Contingency Area	Estimated Contingency ($)
Unexpected site conditions	120,000
Weather delays	45,000
Equipment breakdown	20,000
Software integration issues	3,000
Electrical issues	15,000

Total Contingency Cost: **$203,000**

- Contingencies ~ 9% of overall project budget
- Overall project Budget + Contingencies = **$2,473,250**

Assumptions:

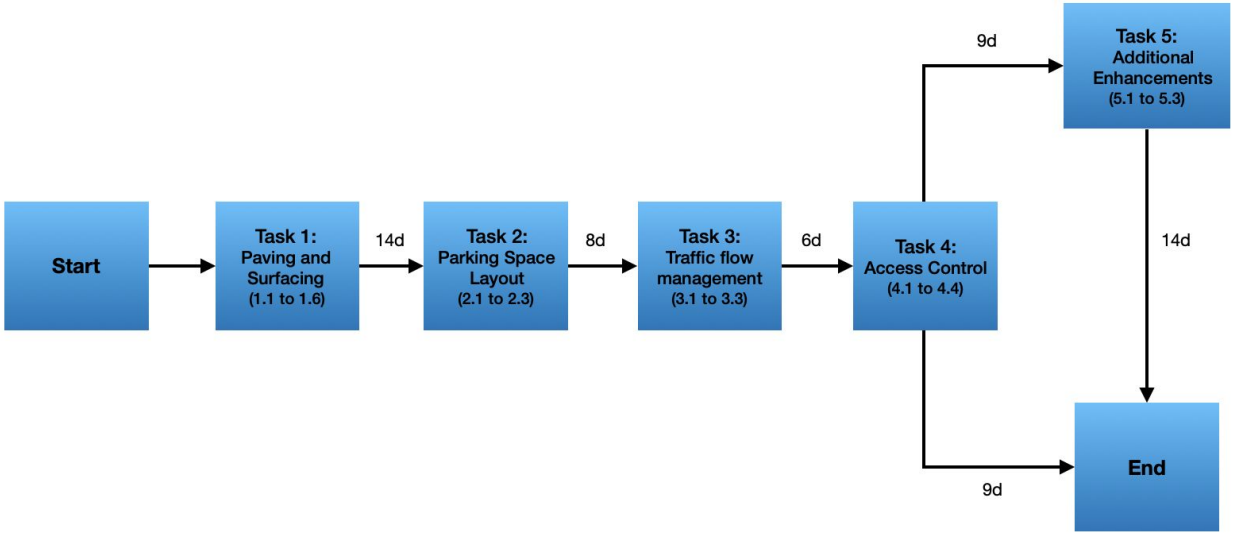
1. 350,000 sq ft of area
2. Cost of workers = $350-$400/day (3-10 workers depending on complexity of task)
3. Skilled labor = $800-$1200/day
4. Equipment rental = $200-1200/day
5. Concrete = $6/sq foot
6. Paint = $0.10/sq foot

Critical Path Analysis

Task No.	Task Name	Sub-tasks	Estimated time frame	Working days
1	Paving and Surfacing	1.1 to 1.6	02/Jun/25 to 19/Jun/25	14
2	Parking space layout	2.1 to 2.3	20/Jun/25 to 01/Jul/25	8
3	Traffic flow management	3.1 to 3.3	02/Jul/25 to 10/Jul/25	6
4	Access Control	4.1 to 4.4	11/Jul/25 to 23/Jul/25	9
5	Additional Enhancements	5.1 to 5.3	24/Jul/25 to 12/Aug/25	14

Sub-task	Sub-task Name
1.1	Site Survey/Assessment
1.2	Excavation of Top Soil
1.3	Formwork
1.4	Rebar Installation
1.5	Concrete Pouring
1.6	Concrete Curing
2.1	Site Assessments/Measurements
2.2	Design of Parking Spaces
2.3	Painting of Spaces
3.1	Traffic Flow Analysis
3.2	Signage and Markings
3.3	Traffic Control Measures
4.1	Site Assessments and Gate Location
4.2	Gate Installation
4.3	Access Control system Installation
4.4	Integration and Testing
5.1	Landscaping and Greenery
5.2	Lighting Installation
5.3	EV Charging Stations

Critical Path Analysis



Critical Path: Start - Task 1 - Task 2 - Task 3 - Task 4 - Task 5 - End (51 days)

Recovery of Schedule

- Task 5 - Additional Enhancements (landscaping & greenery, EV charging stations) can be avoided if the project is behind schedule.
- "Task 4 to End" path can be implemented instead of "Task 4 - Task 5" - End path.
- Task 5 can be done in parallel with task 3.
- Specialised sub-contractors can be availed for high risk activities or activities where estimated time to completion is more.
- Implementation of additional shifts to complete the work.
- Personnel can be allocated to each successor activity once each predecessor sub-task is completed.

Recovery of Schedule Continues

- A 5-10% buffer reserve can be allocated for each work package in case of any deviations from the actual scope or any unforeseen events.
- Buffer time to be accommodated in the project schedule for each milestone to be delivered. Weekly meetings to be held with the project stakeholders to discuss about the project progress and possible hurdles, to mitigate risks.
- High risk activities can be identified beforehand to completely eliminate or minimize the chances of occurrence, through proper communication between surveyor, QA/QC, engineers, procurement, technicians and other parties involved.

Conclusions

- Duration of project: 51 working days
- Total estimated cost: $2,473,250 provided that the project stays within the planned schedule and contingency budget.
- By having a properly designed and executed parking lot and through integrating technology, we will be able to provide a better solution to the existing parking lot 12 issues for the UMass community.
- Can be implemented to improve the efficiency of other parking spaces around the campus.
- Improves safety and promotes sustainable practices.


THANK
YOU!