GOVERNMENT POLYTECHNIC CHHAPAR

DESIGNING OF CAR PARKING FACILITY AND ITS ESTIMATION & COSTING

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1. INTRODUCTION

In recent years, the growth of vehicle ownership has significantly increased the need for efficient and well-planned parking spaces, especially within institutional campuses. Colleges and other educational institutions often face challenges related to traffic congestion, disorganized parking, and inadequate vehicle protection. The **College Parking Project** at Government Polytechnic, Chhapar has been initiated as a strategic solution to address these issues. The aim is to create a well-structured, covered parking facility that ensures safety, improves organization, and enhances convenience for students, faculty, and visitors.

The designated site for the parking facility measures **50 feet in length and 18 feet in width**, which will be efficiently utilized to accommodate **two-wheelers and light four-wheelers** such as motorcycles, scooters, and compact cars. The design incorporates a **sloped roof**, with a height of **12 feet at the back and 11 feet at the front**, allowing effective water drainage during rainy seasons and increasing the longevity of the structure. This covered area will offer essential protection against environmental factors such as rainfall, sun exposure, and dust, thereby preserving the vehicles in better condition.

2.WHAT IS PARKING?

Parking refers to the act of stopping and disengaging a vehicle and leaving it unoccupied. In a broader context, parking is an essential component of urban planning, transportation management, and infrastructure

development. A good parking system contributes to smoother traffic flow, increased safety, and better land utilization. Parking facilities can be either temporary or permanent, open or covered, and manually or automatically operated.

Within institutional premises like colleges, efficient parking facilities serve multiple purposes:

- Preventing haphazard parking that may block access roads or entrances.
- Reducing accidents caused by overcrowded or poorly arranged vehicles.
- Enhancing the campus environment by promoting discipline and order.
- Offering weather protection to prevent vehicle wear and tear.

3. TYPES OF PARKING

Several types of parking systems are used based on the area available, type of vehicles, and usage patterns. The common types of parking include:

1. **Parallel Parking**
   Vehicles are parked parallel to the road, usually along the curb. It occupies less width but more length and is often used on streets as show in fig1.1.

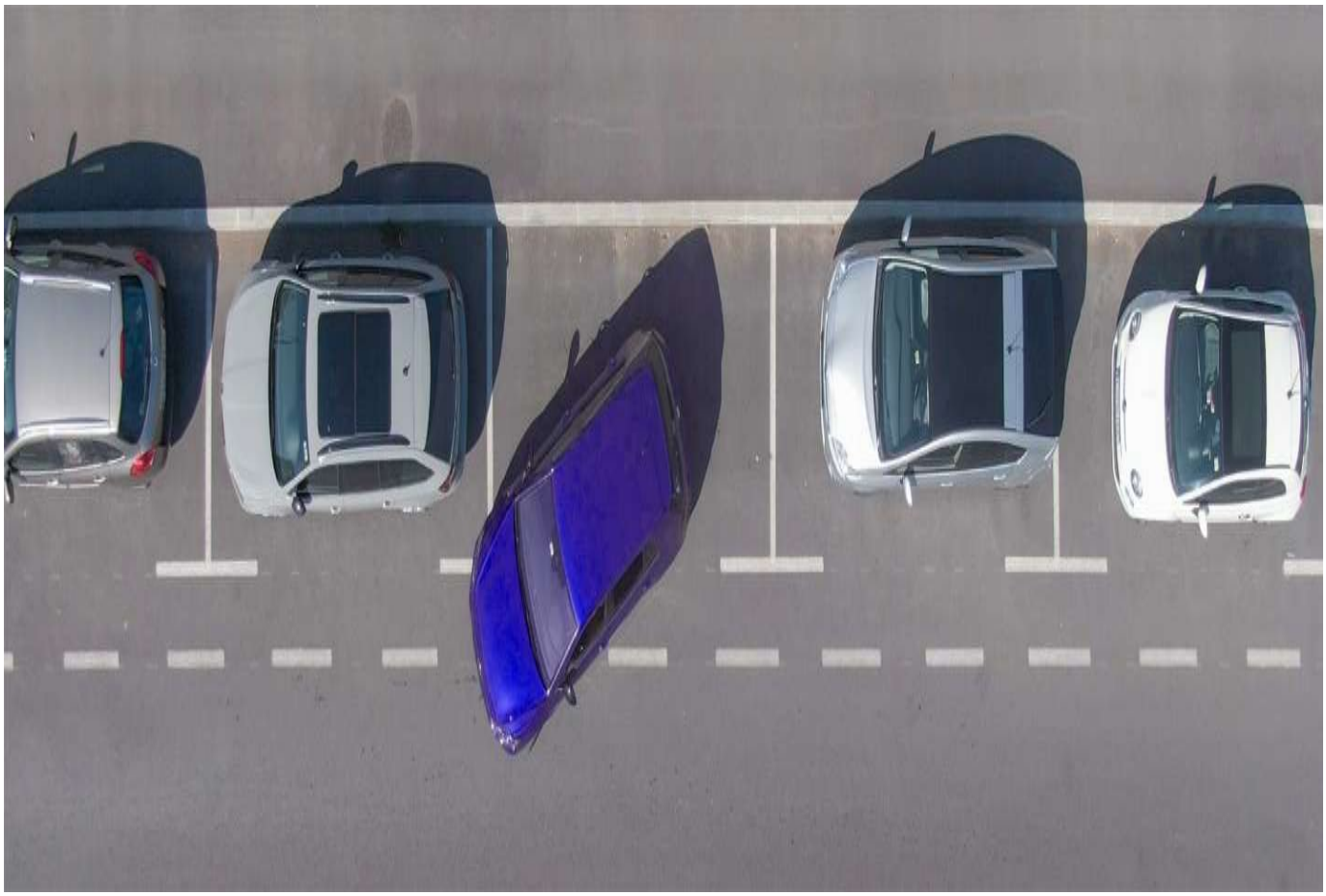

Fig.1.1

2. **Perpendicular Parking (90° Parking)**
   Vehicles are parked at a right angle (90°) to the driving lane. This type offers high capacity and is suitable for large parking lots as show in fig.1.2

Fig.1.2

3. **Angled Parking (45° or 60° Parking)**
   Vehicles are parked at an angle to the curb, allowing easier entry and exit. It requires less maneuvering space than perpendicular parking as show in fig. 1.3

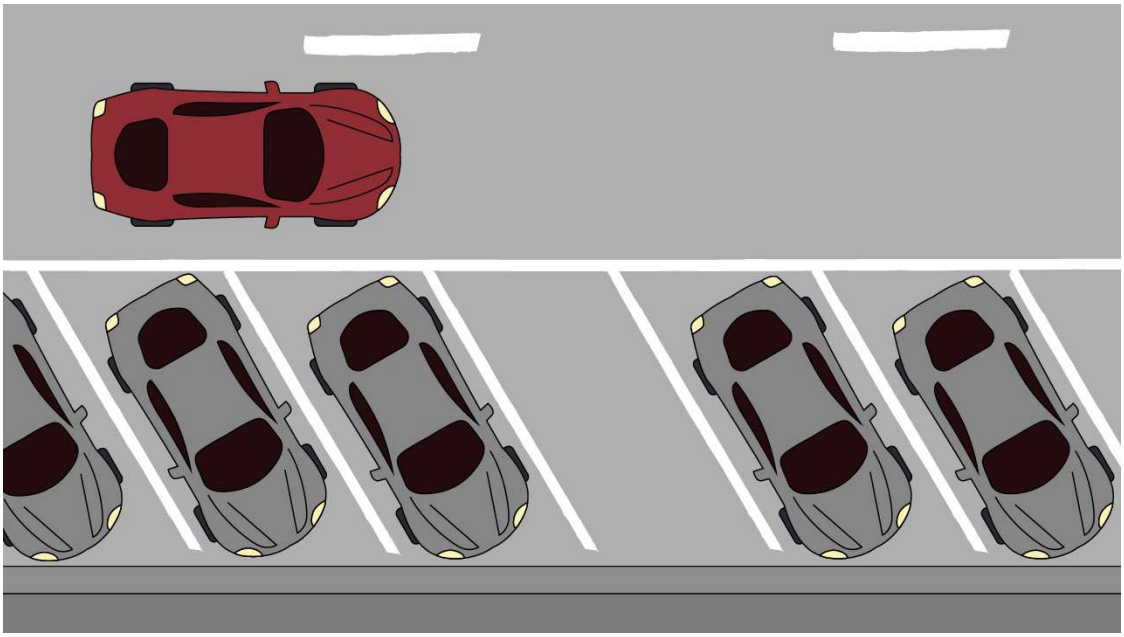

Fig.1.3

4. **Echelon Parking**
   Similar to angled parking but designed in a more staggered fashion to save space and increase visibility as show in fig.1.4

Fig. 1.4

5. **Covered Parking (Carports, Sheds, etc.)**
   A roofed structure that offers protection from weather conditions. This type is ideal for institutions and residential areas as show in fig.1.5

Fig.1.5

6. **Multilevel or Stack Parking**
   Used in areas with limited space, this system utilizes vertical stacking either through mechanical lifts or ramps as show in fig.1.6

Fig.1.6

For the **College Parking Project**, a **covered, perpendicular parking system** will be used to maximize capacity within the 48 ft × 16 ft area, ensuring easy access and protection for both two-wheelers and light four-wheelers.

4.WHY PARKING IS NECESSARY

Parking is a crucial component of transportation and infrastructure, especially in public spaces like schools, colleges, hospitals, and markets. In educational institutions such as **Government Polytechnic, Chhapar**, a planned and designated parking area is **necessary** for the following reasons:

1. **Traffic Management:** Prevents congestion and confusion caused by randomly parked vehicles.

2. **Safety:** Reduces the chances of accidents and allows safe movement of pedestrians and vehicles.
3. **Efficient Space Utilization:** Makes the best use of available land without obstructing movement or functions.
4. **Weather Protection:** Covered parking protects vehicles from rain, sun, dust, and wind, increasing their life.
5. **Aesthetic Improvement:** Organized parking enhances the overall look and functionality of the campus.
6. **Time Saving:** Proper parking reduces the time spent in finding a place to park or retrieving the vehicle.
7. **Compliance:** Helps follow traffic rules and local regulations regarding vehicle management on public or institutional property.

5.ABOUT THE PROJECT

The **Government Polytechnic, Chhapar** has taken a proactive step by initiating the construction of a well-organized parking facility within its campus. The project reflects a commitment to infrastructure development and student convenience. The total covered area of the parking space will be constructed with a slight roof slope (12 ft back, 11 ft front) to ensure water runoff and durability. The structure will likely use **steel columns and trusses**, with sheet roofing materials that are cost-effective, lightweight, and corrosion-resistant.

The expected benefits of the project include:

- Organized and systematic parking of student and faculty vehicles.
- Enhanced aesthetics and professionalism in campus infrastructure.

- Reduced traffic chaos during peak hours or college events.
- Safer movement of pedestrians and vehicles within the campus.

6.ADVANTAGES OF PARKING FACILITIES

1. **Organization and Discipline:**
   A planned parking area encourages disciplined behavior among vehicle users and avoids haphazard parking.
2. **Protection for Vehicles:**
   Covered parking shelters two-wheelers and four-wheelers from harsh weather, which reduces damage and maintenance costs.
3. **Improved Campus Safety:**
   By reducing vehicle obstruction in walkways and roads, it creates a safer environment for students and staff.
4. **Better Use of Space:**
   Planned layouts ensure that the maximum number of vehicles can be parked in a limited area.
5. **Convenience:**
   Students and faculty can quickly locate and park their vehicles, especially during rush hours.
6. **Low Maintenance Cost (for covered sheds):**
   Simple steel or truss sheds require minimal upkeep, making them cost-effective in the long run.
7. **Positive Institutional Image:**
   Clean and well-maintained parking reflects the professionalism and discipline of the college administration.

7.DISADVANTAGES OF PARKING FACILITIES

1. **Initial Construction Cost:**
   Even a basic covered parking area involves expenses for materials, labor, and design.

2. **Space Requirement:**
   It occupies land that could otherwise be used for classrooms, gardens, or sports facilities if not properly planned.

3. **Regular Maintenance Needed:**
   While minimal, the structure still requires occasional maintenance to prevent rust, roof damage, or waterlogging.

4. **Possibility of Misuse:**
   Without proper supervision, unauthorized persons might use the facility or cause damage.

5. **Congestion at Entry/Exit Points:**
   If not designed properly with separate entry and exit routes, traffic jams may still occur during peak hours.

8.SITE SELECTION

Site selection refers to the process of choosing a suitable location for a building or structure, taking into account various factors that can impact its safety, functionality, and sustainability. Key considerations include:

- Geological stability: Avoiding areas prone to landslides, soil liquefaction, or other geological hazards.
- Seismic activity: Considering the site's proximity to fault lines and seismic zones.

- Environmental factors: Assessing flood risk, soil conditions, and environmental hazards.
- Accessibility and infrastructure: Evaluating proximity to transportation, utilities, and services.

❖ **Firstly we have choice three site for parking**

➢ First site

(a) Front view

(b)side view

Fig.2.1

➢Second site

(a)Side view

(b)front view

Fig.2.2

➢Third site

(a)Side view

(b)front view

Fig.2.3

8.1 Reasons for Not Selecting First Site Location for the Parking as show in fig.2.1

Fig.2.1

1. **Congested and Enclosed Space**
   This area is surrounded by walls and windows on all sides, which restricts vehicle movement and limits entry/exit points.
2. **Loading/Unloading Zone**
   The green rolling shutter visible in the image indicates that this area is possibly used as a store or warehouse. Regular vehicle parking here may interfere with the institution's daily operations.
3. **Emergency Exit Requirement**
   There appears to be a door or staircase at the rear, which may serve as an emergency exit. Using this area for parking would block these escape routes and violate safety standards.
4. **Poor Aesthetic and Maintenance Condition**
   The plaster on the right-side wall is damaged, making the space unsuitable from a construction or aesthetic perspective. A parking area should ideally have a visually appealing and well-maintained appearance.
5. **Insufficient Turning Space for Vehicles**
   The area is too narrow, making it difficult for vehicles—especially four-wheelers—to turn or reverse comfortably.
6. **Obstruction to Natural Light and Ventilation**
   Constructing a shed or parking here would block the large front-facing windows, disrupting the natural light and ventilation of the interior rooms.

8.2 Reasons for Not Selecting Second Site Location for the project as show in fig.2.2

Fig.2.2

- **Insufficient Space**:
  The area near the staircase and entryway appears narrow and is part of a building's primary access route. It may not provide enough width or turning radius for safe vehicle movement or parking.
- **Obstruction to Building Access**:
  Parking vehicles here would block entry doors and staircases, interfering with pedestrian access to classrooms or offices and violating basic building circulation design norms.
- **Existing Infrastructure**:
  Air conditioning units, steps, and window fixtures indicate this space is intended for building services or entrances, not vehicular use.

- **Safety Concerns**:
  Parked vehicles could pose a hazard to students and staff using the staircase, especially during emergencies when clear evacuation routes are essential.
- **Lack of Defined Boundaries or Ramps**:
  There's no clear boundary or ramp to guide vehicles from the main road/paved area into this space, making it unsuitable without significant modification.
- **Ventilation and Damage Risks**:
  Windows close to the ground may be damaged by vehicle movement. Exhaust fumes from cars may also enter classrooms, affecting indoor air quality.

8.3 Reasons for Selecting This Parking Area as show in fig.2.3

Fig.2.3

1. **Immediate Accessibility**
   Positioned directly in front of the main academic block, this spot allows students and faculty to step off campus pathways and into classes within seconds—minimizing walking distance and improving campus circulation.

2. **Existing Durable Surface**
   The ground is already paved with interlocking concrete blocks, offering a firm, level base. By re-using this stable platform, you avoid the cost and time of installing new flooring, while ensuring good traction and drainage.

3. **Space Utilization & Capacity**
   With its 50 ft length, the area can comfortably fit 3–4 standard cars (or up to 10 two-wheelers) in a single row without impeding adjacent walkways or entryways. This maximizes vehicle throughput in a compact footprint.

4. **Safety & Visibility**
   An open, well-lit façade and unobstructed sightlines to nearby windows mean parked vehicles remain in full view of passersby and building occupants—discouraging vandalism or theft and making it easy to monitor occupancy.

5. **Minimal Structural Conflicts**
   There are no overhead cables, deep roots, or utility lines in this zone. The clear vertical and horizontal clearance allows straight-forward erection of an MS-frame shed with a sloped roof, without costly relocations or removals.

6. **Natural Drainage & Water Runoff**
   The slight fall toward the front (as seen in the existing paving) channels rainwater away from the building. This complements the proposed shed's sloped roof, together ensuring rapid runoff and dry parking spaces.

7. **Defined Boundaries & Future Expansion**
   Flanked by walls on two sides, this area naturally confines vehicles to a neat rectangle. Should demand grow, adjacent paved zones could be seamlessly integrated, allowing you to scale capacity over time without major re-planning.

9. SITE DETAILS

- Location: Inside the campus of Government Polytechnic, Chhapar
- Area: 48 ft length×16 ft width =768 sq.ft
- Surface: Existing ground surface; no new flooring planned
- Proposed Capacity: Approx. 5–6 light four-wheelers.

10. DESIGN LAYOUT

- Type: Open shed with sloped roof (mild slope toward the front)
- Structure: Mild steel (MS) columns.
- Roofing: Galvanized Iron (GI) or Colour Coated Sheets

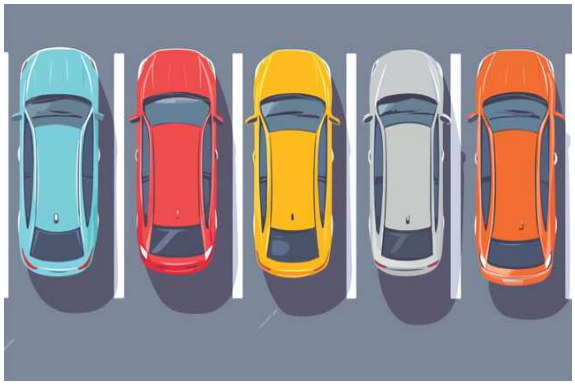

Fig. 10.1

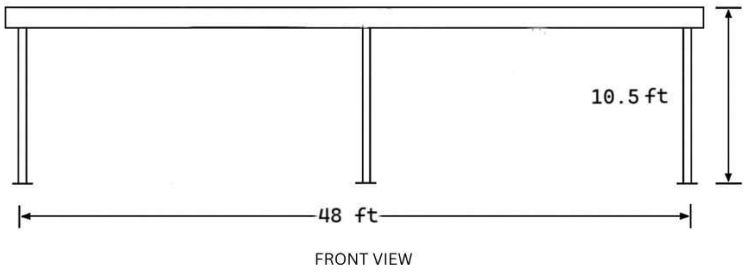

Fig 10.2

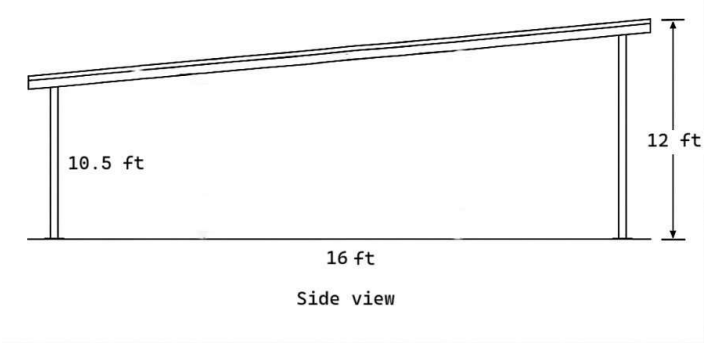

Fig. 10.3

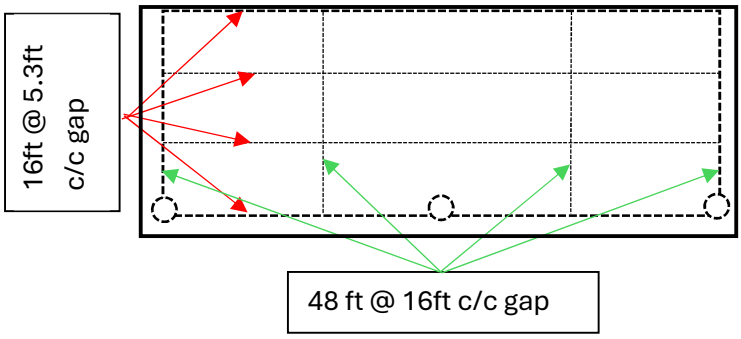

Fig 10.4 (Top View)

11.MATERIAL SPECIFICATIONS

1. GI roofing sheets
2. Hook bolts, washer nuts
3. ISMC Purlin
4. Paint
5. L - Angles
6. Aggregate
7. Sand
8. Cement
9. Columns
10. Welding & Fabrication

12.CALCULATION

A. GI Tin Roofing

Total area = 48 ft.

One sheet cover area = 3.5 ft.

Overlap =0.5 per sheet

Then 48/3= 16 no of sheet

B. Transverse beam

Roof width = 16 ft.
Length of beam to be provided = 18 ft.
No. of Beam provided = 4
Then 18x 4=72 ft.

C. Longitudinal beam

Length of roof =48 ft.

Length of beam to be provided =48 ft.
Number of beams to be provided=4
c/c gap = 16/3 = 5.3 ft.
Total pipe required=48×4 =192 ft.

D. Calculation for column

Number of columns provided=3 Nos

Height of column = 10.5 ft.

Length of column inside ground = 1.5 ft.

Total height of column = 10.5+1.5 =12 ft.

Total pipe required =12×3 =36 ft.

- **Total length required = B+C+D**
- **Each = 72+192+36 = 300 ft.**
- **Total = 300 × 1.5 = 450 kg**
- **450x 75=₹33750**

13. COST & ESTIMATION

Item	Quantity	Unit Cost (INR)	Total Cost (INR)
MS Structural Frame	450 kg	₹75/kg	₹33,750
GI Roofing Sheets	16 sheets 3.5ft X 18ft	₹2200 per sheet	₹35,200
Paint and Finishing	Lump Sum	—	₹2,000
Misc. (Drain, bolts, signage)	220 Bolts	₹ 5 per piece	₹1,100
Angles	8 piece	₹250/ piece	₹2,000
Cement	1 bag	₹375 per bag	₹ 375
Sand	5 sq.ft	₹ 60/sq.ft	₹300
Aggregate	10 sq.ft	₹107/sq.ft	₹1,070
Total Estimated Cost			**₹75,795**

14. BENEFITS

- Provides organized and weather-protected parking
- Reduces vehicle clutter within campus
- Encourages students to park in designated areas
- Enhances campus appearance and safety
- Low maintenance and cost-effective design

15. CONCLUSION

This proposed parking shed will serve the current vehicle parking requirements of Government Polytechnic, Chhapar. Its simple steel frame design and sloped roof make it easy to construct, durable, and suitable for the available space.

16. REFERENCES

The following sources and standards were referred to during the planning and design of the parking shed project:

1. **IS 875 (Part 2):1987** – Indian Standard Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures.
2. **IS 800:2007** – General Construction in Steel – Code of Practice.
3. **National Building Code (NBC) of India** – Guidelines on parking, fire safety, and institutional infrastructure.
4. **CPWD Specifications (Latest Edition)** – For materials, painting, and construction practices.
5. **Local Site Surveys and Measurements** – Data collected at Government Polytechnic, Chhapar.

6. **Steel Construction Manuals and Catalogs** – For selecting mild steel sections and roofing materials.
7. **Market Rate Analysis (2025)** – Local market rates for steel, GI sheets, and labor charges in Rajasthan region.

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17. FEEDBACK & SUGGESTIONS

Faculty/Advisor Feedback (if applicable):

- "The project is well-planned and aligns with real-life infrastructural requirements within educational institutions."
- "Cost estimation and material selection are appropriate for budget constraints."
- "Future expansion scope is thoughtfully considered in site selection."

Peer/Student Feedback:

- "The shed would be very helpful during rains—especially for bike users."
- "Easy access from the main academic block is a big plus."
- "Clear demarcation and signage will improve daily parking discipline."

18. BASIC OVERVIEW OF THE PROJECT

This project focuses on the design and construction of a **covered parking shed** within the premises of **Government Polytechnic, Chhapar**. It aims to:

- Provide an organized and weather-protected area for parking two-wheelers and small four-wheelers.
- Utilize an existing paved surface (50 ft × 18 ft) efficiently.
- Construct a mild steel frame structure with a sloped roof for proper drainage.
- Minimize costs while maximizing utility and aesthetics.
- Support long-term campus planning by enabling future expansi