As per the discussion held with Senthil sir on Thursday (23/04/2026), below I'm providing you with the detail requirement of the **CCTV camera category, as well as components, Console room and Redundancy,** for Mathura under surveillance. I am requesting you to kindly explore it from your end. And also provide your observation for the same.

Note: - The details and data below are based on secondary data, and to the best of my knowledge.

Architecture Overview

- **The Chain Approach:** Because 21 km is a vast distance, the system works like a "relay race." Camera 22 sends data to Camera 21, which sends it to Camera 20, and so on, until it reaches your **Console Room**.
- **The Console Room (Brain):** Everything terminates here. **Server** processes the heavy 4K video, the **VMS** organises the 22 feeds, and the **Video Wall** allows your operators to watch the entire 21 km stretch at once.
- **The Power Factor:** Since this covers a long distance, we have budgeted for **Solar Power Kits**. This is crucial if we cannot find a stable electricity connection every 1 km along the route.

Category	Component	Specification / Brand	Quantity	Est. Total Cost (INR)
Field Units	360° PTZ Cameras	4K, Color Night Vision, Audio (e.g., Hikvision/Dahua)	22 Units	₹9,90,000
Connectivity	Wireless Backhaul	5GHz/60GHz PtP Dishes (e.g., Ubiquiti AirFiber)	22 Pairs	₹3,96,000
Infrastructure	Power & Poles	6m GI Poles + Solar Power Kits + Surge Protection	22 Sets	₹8,14,000
Processing	VMS Server	Dell PowerEdge / HP Z8 (Xeon + RTX GPU)	1 Unit	₹2,50,000
Software	VMS License	Milestone XProtect or Genetec (Enterprise)	22 Ch.	₹1,76,000
Storage	Surveillance HDD	128TB Raw (WD Purple Pro / Seagate SkyHawk)	1 Array	₹3,00,000
Visuals	Video Wall	55" Industrial Bezel-less Monitors (4x Matrix)	4 Units	₹2,20,000
Controls	Network & Input	Cisco Core Switch + PTZ Touchscreen Joystick	1 Set	₹1,50,000
Deployment	Labor & Setup	Site Survey, RF Alignment, & Configuration	Lumpsum	₹3,50,000
GRAND TOTAL				₹36,46,000

Console Room

Category	Item & Specification	Quantity	Estimated Cost (INR)
Furniture	Industrial 2-Operator Console Desk (Motorized height, cable management)	1 Set	₹1,80,000
Seating	24/7 Ergonomic Task Chairs (Stress-tested for continuous use)	2 Units	₹70,000
Display Wall	4-Panel Video Wall Structure (Wall-mount or Floor-stand brackets)	1 Unit	₹85,000
Computing	VMS Processing Server (Dell PowerEdge/RTX GPU configured)	1 Unit	₹2,50,000
Displays	55" Professional Grade Monitors (Bezel-less, 500 nits)	4 Units	₹2,20,000
Networking	48-Port Layer-3 Managed Switch (Cisco/Ubiquiti)	1 Unit	₹1,10,000
Power	5kVA Online UPS (with 2-hour External Battery Bank)	1 Set	₹1,40,000
Interiors	Acoustic Paneling & Static-Dissipative Flooring	Lumpsum	₹1,20,000
TOTAL			₹11,75,000

Feature	Requirement	Importance
Operator View	2+ Screens per operator	One screen for the live 21 km map, others for individual 4K feeds.
Lighting	Dimmable LED (Warm White)	Prevents screen glare and eye strain during night shifts.
Cable Path	Raised Flooring / Under-desk Trays	To keep the 21 km fiber/network terminations organized and safe.
Storage Rack	42U Server Rack	To house the server, network switches, and the 128TB storage array.

Grand Total (Field + Console Room)

- **Field Setup (Cameras, Poles, Wireless, Solar):** ₹24,71,000
- **Console Room (Furniture, Servers, Displays, UPS):** ₹11,75,000
- **Total Capital Expenditure (CAPEX): ₹36,46,000**

Note on "Hidden" Costs: For a 21 km project, we should also budget for a **Local Authority Permit** (if installing poles on public land) and an **Annual Maintenance Contract (AMC)**, which typically costs about **10% of the hardware value** per year to keep the sensors clean and the wireless links aligned.

Redundancy: Secondary Backup Server (often called a Failover Server)

In a high-stakes surveillance project covering 21 km, a **Secondary Backup Server** (often called a **Failover Server**) acts as an insurance policy. If primary server hardware fails, the backup takes over immediately so we don't lose sight of the field.

Type	What it Protects	Description
Server Failover (1:1)	Total Hardware Failure	A second identical server that takes over if the first one dies.
Storage Redundancy (RAID)	Hard Drive Failure	Using a RAID 6 configuration so that even if 2 hard drives crash simultaneously, no video data is lost.
Network Redundancy	Connection Failure	Using two different network switches. If Switch A fails, Switch B keeps the cameras connected.
Power Redundancy	Electrical Failure	Using Dual Power Supplies (PSU) in the server, connected to two different UPS systems.

Cost & Requirement for Redundancy

Component	Specification	Quantity	Est. Cost (INR)
Failover Server	Identical specs to Primary (Xeon/RTX)	1 Unit	₹2,50,000
Failover License	VMS "Redundancy" add-on license	22 Ch.	₹65,000
Secondary Switch	Managed PoE+ Switch (Backup)	1 Unit	₹80,000
TOTAL FOR REDUNDANCY			₹3,95,000

Importance of Redundancy for a 21 km :

- **Without Redundancy:** If one server fails on any night, the entire 21 km stretch is "blind" until a technician arrives with spare parts on the next day or after 2 days. We have zero recordings of anything that happened during the weekend.
- **With Redundancy:** The system is "Self-Healing." We stay protected 24/7, and the technician can repair the broken primary server during normal business hours without any gap in security.

Particulars	**Total Cost**
Total Capital Expenditure (CAPEX)	36,46,000
Cost & Requirement for Redundancy	3,95,000
Grand Total	**40,41,000**