

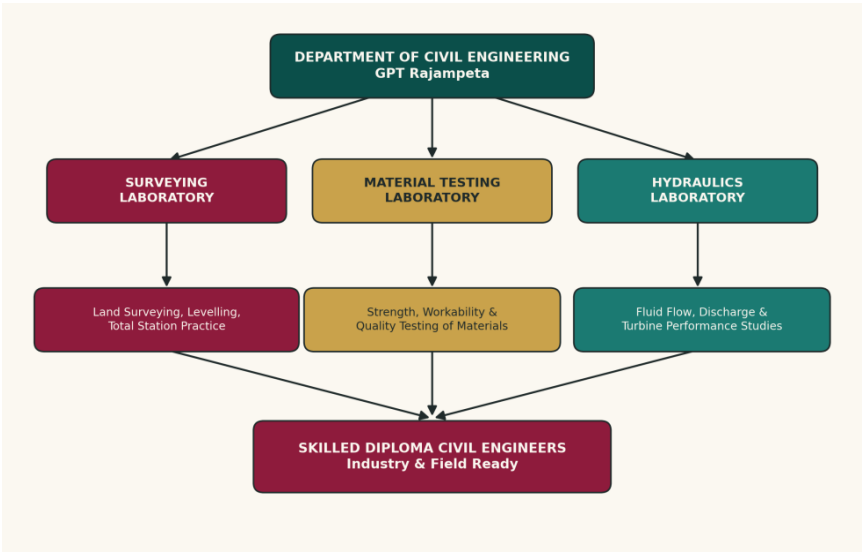
GOVERNMENT POLYTECHNIC, RAJAMPETA

Institution Code: 176 | State Board of Technical Education & Training, Andhra Pradesh

Department of Civil Engineering

COMPREHENSIVE
CIVIL ENGINEERING INFRASTRUCTURE REPORT

Laboratories • Equipment • Investment • Academic Capability



Three Core Laboratories Covered

Surveying • Material Testing • Hydraulics

Report Period

Academic Year 2025-26

Document Profile

This comprehensive report consolidates the physical and academic infrastructure of the Department of Civil Engineering, Government Polytechnic, Rajampeta, with specific focus on the three principal teaching laboratories that anchor the diploma curriculum: the Surveying Laboratory, the Material Testing Laboratory, and the Hydraulics Laboratory. The data presented is drawn directly from official lab stock registers and equipment inventory records maintained by the respective laboratory in-charges.

The report is intended to serve as a ready reference for accreditation visits (NBA/SBTET), internal academic audits, budget planning for future upgradation, and as an institutional record of capital investment in civil engineering teaching infrastructure.

Report Compiled By

Department of Civil Engineering
Government Polytechnic, Rajampeta

Laboratory In-Charges

Surveying Lab: G. Bala Chandra Reddy, L/CE
Material Testing Lab: M. L. Anoop Kumar, Lecturer
Hydraulics Lab: P. Siva Venkata Prasad, L/CE

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1. At a Glance — Key Highlights

A consolidated snapshot of the equipment, investment, and academic capability built into the Civil Engineering Department's laboratory infrastructure at GPT Rajampeta.

3	64	440	₹14.82 L
CORE LABORATORIES	EQUIPMENT TYPES	TOTAL UNITS / ITEMS	EQUIPMENT INVESTMENT

The Department of Civil Engineering at Government Polytechnic, Rajampeta operates three fully equipped laboratories that together form the practical backbone of the diploma curriculum — the Surveying Laboratory, the Material Testing Laboratory, and the Hydraulics Laboratory. Combined, these facilities house 64 distinct categories of instruments and machinery across roughly 440 individual units, representing a cumulative capital investment of ₹14,82,108 built up since the department's establishment.

“Surveying is to civil engineering what the alphabet is to language — the first and most enduring tool of the trade.”

— Civil Engineering Pedagogy, SBTET Curriculum Note

2. Institutional Background

Government Polytechnic, Rajampeta (Institution Code 176), functions under the State Board of Technical Education and Training (SBTET), Andhra Pradesh, and has been a regional centre for diploma-level technical education for several decades. The Department of Civil Engineering is among the institution's core departments, training diploma students in the design, construction, and maintenance disciplines that underpin all civil infrastructure work.

Practical, laboratory-based learning is central to the department's pedagogy. Three dedicated laboratories — Surveying, Material Testing, and Hydraulics — give students direct exposure to the instruments, test procedures, and field practices they will encounter in professional life. Equipment in these laboratories spans both classical manual instruments (chains, compasses, levels) built up over more than a decade, and modern electronic apparatus (Total Stations, GPS units, digital testers) procured in more recent years, reflecting a continuous, incremental investment in keeping pace with industry practice.

VISION

To build civil engineering diploma graduates with hands-on mastery of surveying, materials testing, and hydraulics practice — producing field-ready professionals capable of meeting the rigour of NBA accreditation standards and the demands of the construction industry.

3. Laboratory Ecosystem

The diagram below illustrates how the department's three laboratories connect to the broader academic mission — each lab delivering a distinct, specialised competency that together produces a well-rounded, field-ready civil engineering diploma holder.

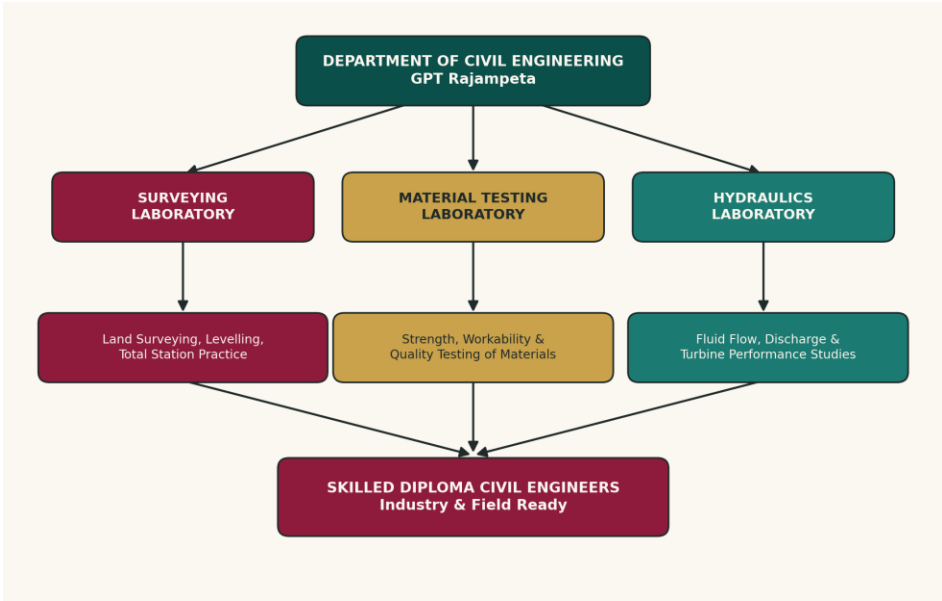


Figure 1: Flow from departmental laboratories to graduate competency outcomes

4. Financial & Quantitative Overview

The three laboratories represent a combined equipment investment of ₹14,82,108, built up through purchases ranging from 2009 to 2023. The Surveying Laboratory accounts for the largest share of this investment, reflecting both the breadth of survey instrumentation required and the high unit cost of precision items such as Total Stations and Theodolites.

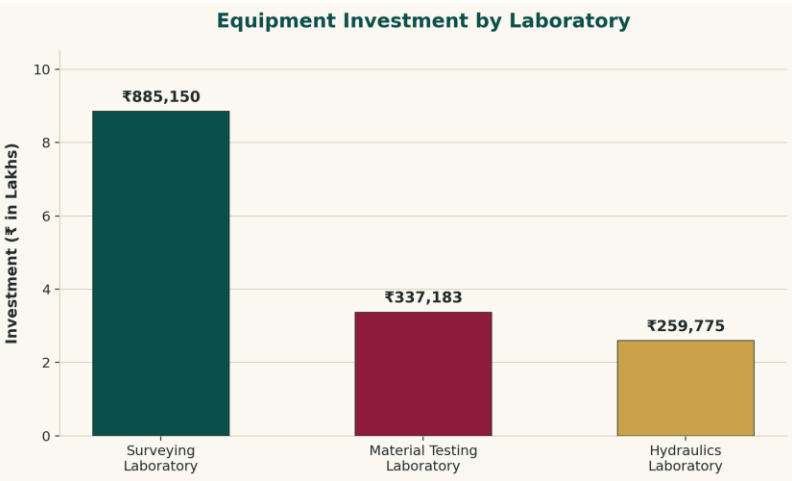


Figure 2: Cumulative equipment investment by laboratory (₹ in Lakhs)

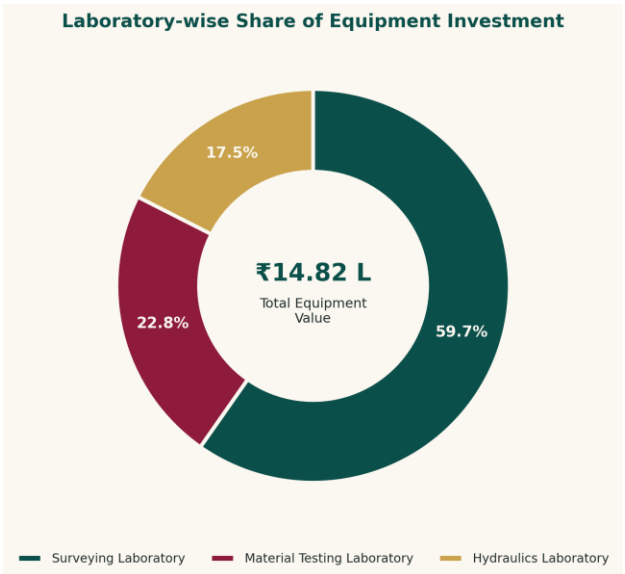


Figure 3: Laboratory-wise percentage share of total equipment investment

Equipment diversity — the number of distinct categories of instruments — is a useful indicator of curriculum breadth, while total unit count reflects the laboratory's capacity to support batch-wise practical sessions. The Surveying Laboratory leads decisively on both counts, owing to the need for multiple students to simultaneously practise with chains, tapes, ranging rods, and levelling instruments during field exercises.

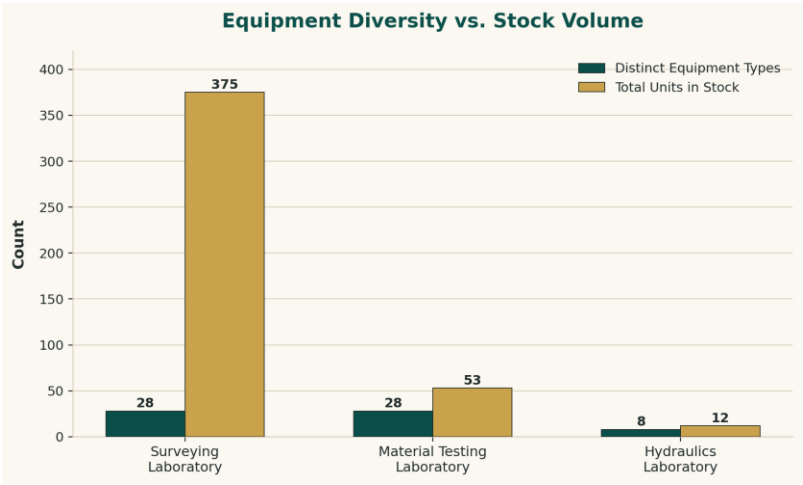


Figure 4: Equipment diversity (distinct types) versus total stock volume (units)

Laboratory	Equipment Types	Total Units	Investment (₹)	% Share
Surveying Laboratory	28	375	8,85,150	59.7%
Material Testing Laboratory	28	53	3,37,183	22.8%
Hydraulics Laboratory	8	12	2,59,775	17.5%

Note: Figures are derived from the official Lab Stock Registers maintained for each laboratory and represent cumulative purchase value at historical (acquisition-date) prices; no revaluation or depreciation has been applied.

5. Procurement Timeline

Equipment acquisition across the three laboratories has occurred in distinct phases rather than a single bulk purchase, reflecting incremental capital grants received over more than a decade. The earliest core instrumentation — the Hydraulics Laboratory test rigs and the bulk of the Surveying Laboratory's classical instruments — dates back to 2009. The most recent significant addition is the Electronic Total Station, procured for the Surveying Laboratory in 2022–23.

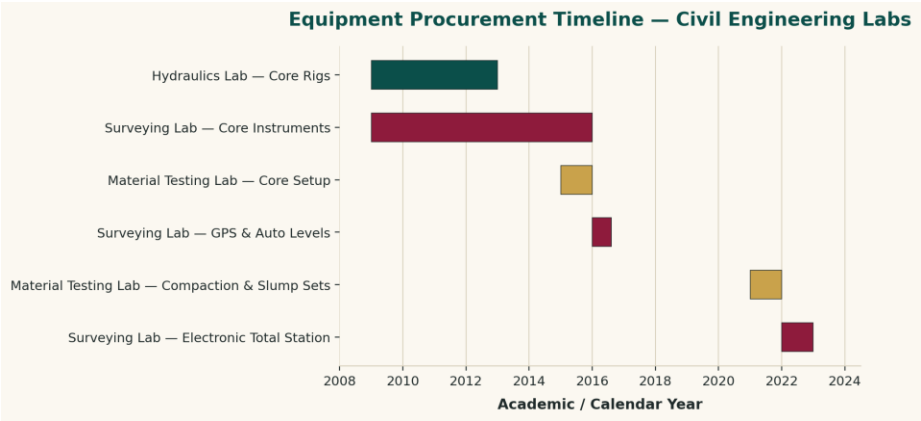


Figure 5: Equipment procurement timeline across the three laboratories, 2009–2023

Notably, the Hydraulics Laboratory has received no fresh equipment investment since its initial setup, while the Material Testing Laboratory saw a meaningful refresh in 2021–22 with the addition of compaction, slump, and cylindrical mould testing apparatus. This pattern highlights the Hydraulics Laboratory as a priority candidate for the next phase of capital upgradation.

“An engineer's instruments are only as good as the day they were calibrated — sustained investment in laboratory equipment is sustained investment in the quality of the engineers we produce.”

— Department Planning Note, Civil Engineering

6. Laboratory Deep Dive — Surveying Laboratory

SURVEYING LABORATORY

Lab In-Charge: G. Bala Chandra Reddy, Lecturer in Civil Engineering

The Surveying Laboratory is the largest and most heavily resourced facility in the department, equipped to train full batches of students simultaneously in chain surveying, compass surveying, plane table surveying, levelling, and modern instrument-based total station surveying. The laboratory's inventory spans 27 distinct line items — from simple metric chains and ranging rods used in foundational field exercises, to the Electronic Total Station, the single most valuable instrument in the department at ₹2,60,000.

27	375	₹8.85 L
EQUIPMENT TYPES	TOTAL UNITS	TOTAL VALUE

Equipment Highlights

- Total Station (NTS 352) and Electronic Total Station (Ruide RCS) — the two flagship precision instruments, together valued at ₹4,74,000, enable modern coordinate-geometry-based surveying practice.
- Fifteen Transit Theodolites and fifteen Dumpy Levels provide enough capacity for large batches to conduct angular and levelling exercises in parallel.
- Classical instruments — prismatic compasses, plane tables, chains, and ranging rods — remain in active use, preserving fundamental field-surveying skills alongside electronic methods.
- A GPS unit and Electronic Planimeter extend the laboratory's capability into satellite-based positioning and digital area computation.

Complete Equipment Inventory

The table below reproduces the laboratory's official stock register in full. All items listed were procured prior to the 2017–18 academic year, with the sole exception of the Electronic Total Station, added in 2022–23.

S.No	Equipment	Specification	Qty	Unit Price (₹)	Total Cost (₹)
1	Metric Chain	30M with 150 links	15	590	8,850
2	Cross Staff	Aluminium moulded, threaded rod top	15	60	900
3	Arrows	Standard surveying arrows	100	30	3,000
4	Line Ranger	Standard	5	260	1,300
5	Telescope Alidade	Standard	1	1,950	1,950
6	Metallic Tape	15 m	20	139	2,780
7	Metallic Tape	10 m	20	205	4,100
8	Ranging Rod	2 m	30	120	3,600
9	Ranging Rod	3 m	30	179	5,370
10	Offset Rod	Standard	5	205	1,025
11	Wooden Peg	Standard	50	34	1,700
12	Prismatic Compass	Gun metal & brass, agate stone bearing	15	860	12,900
13	Surveyor Compass	Standard	2	860	1,720
14	Plane Table (Set)	Alidade, U-fork, spirit level, trough compass, plumb bob	4	2,340	9,360
15	Minor Instruments	Abney level, pantograph, ghat tracer, planimeter	2	3,070	6,140
16	Dumpy Level	228 mm (9") internal focussing	15	3,300	49,500
17	Levelling Staff	Aluminium telescopic, 3-part, 5 m	15	575	8,625
18	Tilting Level	Standard	2	4,300	8,600
19	Theodolite	Transit theodolite	15	8,220	1,23,300
20	Electronic Theodolite	Standard	1	43,100	43,100
21	Total Station	NTS 352	1	2,14,000	2,14,000
22	Optical Square	Standard	1	190	190
23	Electronic Planimeter	Standard	1	40,400	40,400
24	Auto Level	Towa, Model BK-24	1	6,990	6,990
25	Auto Level	Crion, erect-angle, 32x magnification, automatic compensator, aluminium tripod	3	16,500	49,500
26	GPS Unit	Standard handheld	1	16,250	16,250
27	Electronic Total Station	Ruide RCS, angle accuracy 2", 5000 m prism range, dual screen — procured AY 2022–23	1	2,60,000	2,60,000

Total Cost of Equipment: ₹8,85,150

Condemnation, Repairs, Consumables & Furniture

As per the official records: no equipment has been condemned or repaired in the Surveying Laboratory in any academic year since 2017–18. No consumables have been procured. The Furniture register lists no dedicated furniture items separately, as laboratory furniture for this section is accounted for under the department's common furniture register.

7. Laboratory Deep Dive — Material Testing Laboratory

MATERIAL TESTING LABORATORY

Lab In-Charge: M. L. Anoop Kumar, Lecturer in Civil Engineering

The Material Testing Laboratory equips students to evaluate the physical and mechanical properties of construction materials — cement, aggregates, concrete, and metals — against Indian Standard (IS) specifications. Its inventory of 27 distinct equipment types covers the full testing chain from raw-material grading (IS sieves) through to finished-product strength assessment (compression and impact testing).

27	53	₹3.37 L
EQUIPMENT TYPES	TOTAL UNITS	TOTAL VALUE

Equipment Highlights

- The Izod/Charpy Impact Tester (₹95,000) and Rockwell-cum-Brinell Hardness Tester (₹74,250) are the laboratory's two highest-value instruments, enabling mechanical-property testing of metals to engineering standards.
- A complete set of IS Sieves for both coarse and fine aggregate grading supports particle-size-distribution practicals central to concrete mix design.
- The 2021–22 academic year saw a focused upgrade with five new acquisitions — Compaction Factor apparatus, Slump Cone, Standard Proctor set-up, Thickness/Length gauges, and Cylindrical Moulds — strengthening the laboratory's concrete-technology testing capability.
- Five long-standing furniture items (Almirah, Demo Table, Long Tables and Benches, S-Type Chair) support laboratory organisation and demonstration sessions.

Complete Equipment Inventory

Items 1–22 were procured prior to the 2017–18 academic year (with original purchase dates ranging from March 2015 to March 2016); items 23–27 were added in the 2021–22 academic year as part of a concrete-technology equipment refresh.

S.No	Equipment	Specification	Qty	Unit Price (₹)	Total Cost (₹)
1	IS Sieves — Coarse Aggregate	12" GI frame; 63, 40, 20, 16, 12.5, 10, 4.45 mm + lid & pan	8	550	4,400
2	IS Sieves — Fine Aggregate	8" brass frame; 4.75, 2.36, 1.18 mm, 600µ + lid & pan	5	875	4,375
3	IS Sieve — 90 Micron	8" brass frame	1	1,250	1,250
4	Vicat's Apparatus	With needle & dashpot	3	3,950	11,850
5	Sieve Shaker	Hand operated	1	14,000	14,000
6	Field Density Test Apparatus	Complete set	1	3,250	3,250
7	Deflection of Beam Apparatus	Standard	1	9,500	9,500
8	Aggregate Impact Tester	With counter & tamping rod	1	16,000	16,000
9	Digital Electronic Balance	10 kg capacity, 1 g sensitivity	1	9,500	9,500
10	Liquid Limit Apparatus	With counter & tools	1	3,750	3,750
11	Plastic Limit Apparatus	Set	1	1,650	1,650
12	Measuring Jar	250 ml, borosilicate glass	5	300	1,500
13	Measuring Jar	500 ml, borosilicate glass	5	500	2,500
14	Pycnometer	1 litre	5	1,200	6,000
15	Stop Watch	Pacer make	4	450	1,800
16	Cement Cube Mould	7.06 × 7.06 cm	1	700	700
17	Izod / Charpy Impact Tester	Complete Izod & Charpy set-up	1	95,000	95,000
18	Bulk Density Test Apparatus	Set	1	11,500	11,500
19	GI Tray	24" × 24" × 3"	2	1,200	2,400
20	Cement Cube Mould	7.06 × 7.06 cm	3	700	2,100
21	Rockwell-cum-Brinell Hardness Tester	150 kg load capacity	1	74,250	74,250
22	Concrete Cube Mould	15 × 15 × 15 cm	3	1,650	4,950
23	Compaction Factor Test Apparatus	As per IS 5515:1983 — AY 2021–22	1	30,650	30,650

S.No	Equipment	Specification	Qty	Unit Price (₹)	Total Cost (₹)
24	Thickness & Length Gauge Set	1 set — AY 2021–22	1	1,534	1,534
25	Slump Cone Test Apparatus	1 set — AY 2021–22	1	3,776	3,776
26	Standard Proctor Test Set-up	1 set — AY 2021–22	1	3,776	3,776
27	Cylindrical Mould (Concrete)	15 cm dia × 30 cm height — AY 2021–22	3	5,074	15,222

Total Cost of Equipment: ₹3,37,183

Furniture Inventory

S.No	Furniture Item	Quantity
1	Almirah	1
2	Demo Table	1
3	Long Table	2
4	Long Bench	2
5	S-Type Chair	1

Condemnation, Repairs & Consumables

As per official records: no equipment has been condemned or repaired in the Material Testing Laboratory since 2017–18, and no consumables have been procured against the laboratory's separate consumables register.

8. Laboratory Deep Dive — Hydraulics Laboratory

HYDRAULICS LABORATORY

Lab In-Charge: P. Siva Venkata Prasad, Lecturer in Civil Engineering

The Hydraulics Laboratory is the most compact of the three facilities, comprising eight specialised test rigs that demonstrate fundamental principles of fluid mechanics — flow measurement through notches and orifices, energy conservation via Bernoulli's theorem, pipe friction losses, and turbine performance characteristics. Each major apparatus is built around a self-contained measuring tank and 0.5 HP recirculating pump system, allowing repeatable, closed-loop experiments.

8 EQUIPMENT TYPES	12 TOTAL UNITS	₹2.60 L TOTAL VALUE
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Equipment Highlights

- Four flow-measurement rigs — Notch, Orifice & Mouthpiece, Venturimeter & Orificemeter, and Friction Factor apparatus — each valued at ₹47,500, form the core of the laboratory's experimental capability.
- Three turbine demonstration models (Pelton, Kaplan, and Francis) give students a physical, visual understanding of hydro-power generation principles.
- The Bernoulli's Theorem Apparatus, also valued at ₹47,500, rounds out the laboratory's coverage of fluid energy and flow-measurement principles.
- All eight equipment items were procured in a single early phase (2009–13) and have remained in continuous service since, with no replacements, repairs, or condemnations recorded.

Complete Equipment Inventory

All items below were procured prior to the 2017–18 academic year. No equipment has been added to this laboratory in any subsequent academic year, making it the department's most overdue facility for a capital refresh.

S.No	Equipment	Specification	Qty	Unit Price (₹)	Total Cost (₹)
1	Notch Apparatus (Rectangular, Triangular, Trapezoidal)	Measuring tank 300×300×500 mm; S.S. pump tank 900×300×450 mm; 0.5 HP pump	1	47,500	47,500
2	Orifice & Mouthpiece Apparatus	Measuring tank 300×300×500 mm; S.S. pump tank 900×300×450 mm; 0.5 HP pump	1	47,500	47,500
3	Venturimeter & Orificemeter Apparatus	Measuring tank 300×300×470 mm; S.S. pump tank 900×300×470 mm; 0.5 HP pump	1	47,500	47,500
4	Friction Factor Apparatus	Measuring tank 300×300×470 mm; S.S. pump tank 900×300×470 mm; 0.5 HP pump	1	47,500	47,500
5	Pelton Turbine (Model)	Demonstration model	1	8,350	8,350
6	Kaplan Turbine (Model)	Demonstration model	1	5,725	5,725
7	Francis Turbine (Model)	Demonstration model	1	8,200	8,200
8	Bernoulli's Theorem Apparatus	Measuring tank 300×300×475 mm; S.S. pump tank 950×350×475 mm; 0.5 HP pump	1	47,500	47,500

Total Cost of Equipment: ₹2,59,775

Furniture Inventory

S.No	Furniture Item	Quantity	Value (₹)
1	Almirah	1	12,000
2	Demo Table	1	6,000
3	Chair	1	1,950
4	Office Table	1	1,200

Total Furniture Value: ₹21,150

Condemnation, Repairs & Consumables

As per official records: no equipment has been condemned or repaired in the Hydraulics Laboratory since establishment, and no consumables have been procured against the laboratory's separate consumables register.

“Water finds its own level — and so too must our investment, flowing steadily to the laboratories that have waited longest for renewal.”

— Department Reflection, Hydraulics Laboratory Review

9. Observations & Strategic Outlook

Reviewing equipment age, investment distribution, and academic demand together points to clear priorities for the department's next phase of laboratory development.

Strengths

Current Position

- The Surveying Laboratory is comprehensively equipped, with sufficient quantities of core instruments (15 each of theodolites, dumpy levels, chains) to support full-batch practical sessions.
- Two modern electronic survey instruments (Total Station and Electronic Total Station) give students exposure to industry-current surveying technology.
- The Material Testing Laboratory's 2021–22 refresh demonstrates the department's ability to secure and deploy fresh capital grants effectively.

Areas Requiring Attention

Priorities for Renewal

- The Hydraulics Laboratory has received no equipment investment since 2009–13; all eight apparatus are now over a decade old and should be assessed for recalibration, refurbishment, or replacement.
- Single-unit holdings of high-value instruments (Total Station, Electronic Theodolite, Electronic Planimeter, GPS) create a bottleneck when multiple student groups require simultaneous access.
- No consumables procurement has been recorded in any of the three laboratories, which may understate actual operating expenditure and warrants a review of stock-register practices.

Recommended Next Steps

Forward Plan

- Prioritise a Hydraulics Laboratory upgradation proposal under the next available SBTET NBA Equipment Grant cycle, drawing on the precedent set by the Computer Laboratory's 2023 grant utilisation.
- Consider a second Total Station or Electronic Theodolite to reduce single-instrument dependency in the Surveying Laboratory during peak practical hours.
- Formalise consumables tracking across all three laboratories to maintain audit-ready records ahead of NBA accreditation visits.

10. Conclusion

The Department of Civil Engineering at Government Polytechnic, Rajampeta has, over more than a decade, built a substantial and largely well-maintained base of laboratory infrastructure across surveying, material testing, and hydraulics — representing a combined investment of ₹14.82 lakhs in equipment alone. This infrastructure directly underpins the department's ability to deliver hands-on, industry-relevant diploma education and to meet NBA accreditation requirements for practical training facilities.

The picture that emerges is one of strong foundational capacity, anchored by the Surveying Laboratory's breadth, and a clear, actionable opportunity in the Hydraulics Laboratory, which now stands as the department's most overdue facility for fresh capital investment. With continued, targeted funding — following the model successfully used for the Computer Laboratory's 2023 upgradation — the department is well positioned to bring all three laboratories to a uniformly modern standard.

“We do not build engineers in classrooms alone — we build them at the levelling staff, the sieve shaker, and the notch tank, one careful measurement at a time.”

— Government Polytechnic, Rajampeta — Department of Civil Engineering

11. Signatures & Verification

This report has been compiled from official Lab Stock Register and Stores Register entries maintained by the respective laboratory in-charges of the Department of Civil Engineering, and is verified as accurate as of the date of preparation.

Lab In-Charges

Surveying / Material Testing /
Hydraulics

Head of Section

Civil Engineering, GPT Rajampeta

Principal

Government Polytechnic, Rajampeta