successful, and in the world of research and grants as well as in business, a successful proposal often means the difference between working and looking for another job.

Exhibits 15.2–15.4 will give you a fair idea of how to write well-structured, persuasive proposals.

Sample Proposal 1

A PROJECT PROPOSAL ON

CONTROLLED CURING FOR QUALITY CONCRETE

Submitted by

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and

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Submitted to

Secretary

Ministry of Transport and Rural development
Government of Rajasthan

Birla Institute of Technology & Science
BITS, Pilani (Raj.) 333 031

Draft Contract

Project Title:	CONTROLLED CURING FOR QUALITY CONCRETE
Broad Subject:	Civil Engineering
Sub Area:	Concrete Technology
Duration:	2 yr.
Total Cost:	Rs. 2,53,200
Principal Inv.:	Dr. R.Gupta
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Executive Summary

A large number of sealing compounds have been developed in recent years. The idea is to obtain continuous seal over the concrete surface by means of firm impervious film to prevent moisture in concrete from escaping by evaporation. These films have been produced or used at the interface of the ground and concrete to prevent the absorption of water by the ground from the concrete. Materials

like bituminous compounds, polythene, waterproofing paper, and rubber compounds can be used. Bituminous compounds, being black in colour, absorb heat when applied to the top surface of the concrete, resulting in increase in temperature of the body of concrete, which is undesirable. For this reason, the experimental procedure uses polythene compounds like coloured plastics so as to reduce the above effect.

For the proposed project, different light, impervious coloured polythene films will be used for the concrete curing in different, extreme, environmental conditions. The coloured polythene films will reflect/refract/absorb a particular fraction of light rays. This different light fraction will have different energy. The objective of the proposed project is to obtain the coloured films which are best suited in different existing conditions. The initial tests will be conducted for the number of permutations and combinations (like, red, green, blue, violet, and their combinations). From the initial observations, some combinations will be chosen for detailed experimental studies.

The outcome of the project is envisaged in terms of the reduction of quantity of water used in curing and re-use of polythene films/bags for the production of quality concrete.

Key words (Max-six): Quality, Concrete, Curing, Polythene films, Reuse.

Body of the Proposal

a. Origin of the proposal

Curing means creation of an environment which is favourable to the setting and hardening of the concrete. The desirable conditions are: a suitable temperature as it governs the rate of chemical reaction or action involving setting and hardening, a provision of sufficient moisture or the prevention of loss of moisture, and the avoidance of premature stressing or disturbance. Curing has pronounced effect upon the strength of concrete.

The methods of curing normally used nowadays are:

1. Water curing
   a. Immersion
   b. Ponding
   c. Spraying
   d. Wet covering
2. Membrane curing
3. Application of heat
   a. Steam curing at ordinary pressure
   b. Steam curing at high pressure

c. Curing by infra-red radiation
d. Electrical curing
4. Chemical curing (calcium chloride)

In the normal curing methods like water curing, a large amount of water is required, and wastage of water is unavoidable. In Rajasthan, where the temperature varies to both extremes, and where there is scarcity of water in most places, we need a method of curing that can be used during both the extreme climatic seasons without using much of water and wasting much of heat energy. So we would like to find a medium other than water which can be used as a curing material and give the concrete the same properties like reducing shrinkage, accelerating strength gain, minimizing creep, and improving properties like abrasion resistance, impermeability, etc. We know that the quantity of water normally mixed for making concrete is more than sufficient to hydrate the cement, provided this water is not allowed to go out from the body of concrete. For this reason, concrete could be covered with a membrane which will effectively seal off the concrete. For a membrane we can provide polythene or coloured polythene as it does a good job for the above purpose and also it is reusable.

b. Statement of the Problem

Curing can be described as keeping the concrete moist and warm enough so that hydration of cement can continue. More elaborately, it can be described as the process of maintaining a satisfactory moisture content and a favourable temperature in concrete during the period immediately following placement, so that hydration of cement may continue until the desired properties are developed to a sufficient degree to meet the requirement of service.

In hot places or extreme climates as in Rajasthan, the quick surface drying of concrete results in the movement of moisture from the interior to the surface. This steep moisture gradient causes high internal stresses which are responsible for internal microcracks in the semi-plastic concrete.

Concrete, while hydrating, releases high heat of hydration. This heat is harmful from the point of view of volume stability. If the heat generated is removed by some means, the adverse effect due to the generation of heat can be reduced. This can also be done by membrane curing.

Sometimes, concrete is placed in some inaccessible, difficult, or far-off place. The curing of concrete placed over cannot be properly supervised. The curing is entirely left to workmen, who do not quite understand the importance of regular un-interrupted curing. In such cases, it is much safer to adopt membrane curing rather than to leave the responsibility of curing to workers.

Compounds used for membrane curing:
1. bituminous compounds

2. polythene or polyester film
3. waterproof paper
4. rubber compounds
5. wax
6. combination of wax and resin

We would like to specifically go into the polythene or polyester filming of the concrete surface by taking into account, heat, radiation, humidity, and all other atmospheric and natural factors that could affect curing of the specimen. Over the years, researchers have used white pigment or colourless paper (polythelene) as a curing medium but we would like to introduce coloured polythene/paper, such as red, green, and blue, as a curing compound.

c. Objectives

- Comparison of the strength of concrete adopting curing by normal methods.
- Reduction in quantity of water for curing
- Reuse of polythelene films/ bags
- Production of quality concrete in prevailing environmental conditions

d. Work-plan

Initially a literature survey will be carried out. Simultaneously the required material will be procured. Cubes, beams, and cylinders will be cast during the year at different climatic conditions. The different curing conditions will be imposed. After a specific period of time, destructive and non-destructive testing of cubes, beams, and cylinders will be conducted. Based on observations and analysis, results and conclusions will be drawn.

e. Methodology

We would like to cast concrete cubes and beams for all different grades of concrete (M_{20}, M_{25}, M_{30}) and for beams taking mild steel and tor steel and curing by all methods presently used today and also by the present method of study, after which we would like to test the beams and cubes for flexure and compression.

Tests on the specimen

1. Compression testing
2. Flexure testing
3. Non-destructive testing
4. Resonance method
5. Pulse Technique method

Curing procedures

1. Ponding
2. Water spraying
3. Wet hessian curing
4. Covering with colourless polythelene sheets
5. Covering with coloured polythelene sheets (red, blue, green, violet, red+violet, etc.)

f. Time schedule

A. Literature survey	60 days
B. Procurement of material	30 days
C. Casting of cubes (800 in no.)	365 days
D. Casting of beams (400 in no.)	365 days
E. Casting of cylinders (400 in no.)	365 days
F. Testing of cubes and beams	500 days
G. Observation, results, and analysis	60 days
H. Preparation of reports	90 days
Total duration	**2 years**

g. Suggested plan of action for utilization of research outcome

The outcome of the project is envisaged in terms of the reduction of quantity of water for curing purpose and reuse of polythene films/bags for the production of quality concrete. Seminars at national level will be conducted for practising professionals to impart the knowledge. The outcome of the project will also be brought out in printed form.

TOTAL BUDGET ESTIMATES: SUMMARY

(In Rupees)

Items	Budget		
	1st Yr.	2nd Yr.	Total
Recurring			
1. Salaries/Wages	54,000	54,000	1,08,000
2. Consumables*	40,000	25,000	65,000
3. Travel	15,000	25,000	40,000
4. Other costs	20,000	20,000	40,000
Total	1,29,000	1,24,000	2,53,000

* Please refer to Appendix C

BUDGET FOR SALARIES/WAGES

(in Rupees)

Designation (number of persons)	Monthly Emoluments	Budget		
		1st Yr.	2nd Yr.	Total
JRF (1) Full-time	2000/2100	24,000	24,000	48,000
(1)Semi-skilled, full-time	1500	18,000	18,000	36,000
(1)Unskilled, full-time	1000	12,000	12,000	24,000
Total	4,500	54,000	54,000	1,08,000

The wages will be revised as per the norms of Rajasthan Govt.

- 1 JRF: The person will supervise all the laboratory tests.
- 1Semi-skilled: The person will be fabricating cubes, cylinders, and beams and helping in testing.
- 1Unskilled: The person will be helping in transporting materials and in fabricating cubes, cylinders, and beams.

BUDGET FOR CONSUMABLE MATERIALS/EQUIPMENT

(in Rupees)

Head		Budget		
		1st Yr.	2nd Yr.	Total
1. Material*	Q			
	B	40,000	25,000	65,000
Total		40,000	25,000	65,000

* Please refer to Appendix C

Q—Quantity/number B—Budget

BUDGET FOR TRAVEL

(in Rupees)

Item	Budget		
	1st Yr.	2nd Yr.	Total
1. Collection of literature	5,000	5,000	10,000
2. Attending conferences, seminars, symposium, workshop, etc.	10,000	20,000	30,000
Total	15,000	25,000	40,000

- The Institute has adequate library facilities. Most recent journals and books are also available. However, to update the knowledge/information, some recent literature is needed.
- For updating the knowledge, gathering the latest information, presenting papers to impart the knowledge, and sharing the views with other experts in the field, authors will attend various seminars and conferences.

BUDGET FOR OTHER COSTS

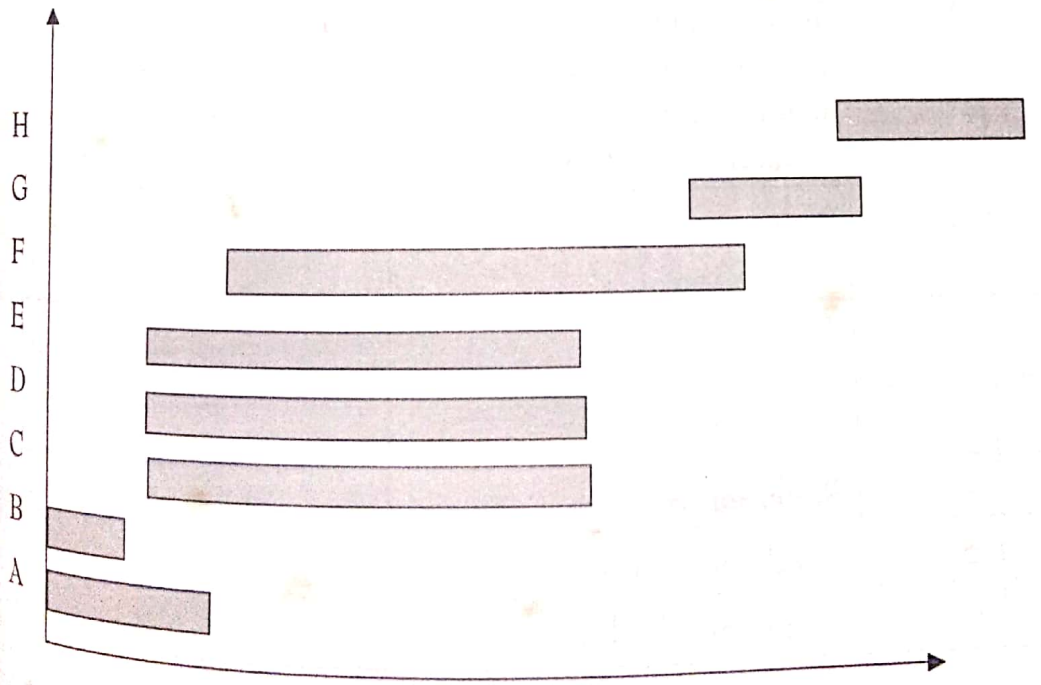
(in Rupees)

Item	Budget		
	1st Yr.	2nd Yr.	Total
a. Contingencies	10,000	10,000	20,000
b. Others (typing reports, papers, etc.)	10,000	10,000	20,000
Total	20,000	20,000	40,000

- In such work, inflation of material cost, labour cost, and other contingency have to be taken into account.
- Reports and other printed material are needed for others to refer to the work in future.

TIME SCHEDULE ACTIVITIES BAR DIAGRAM

A. Literature survey	60 days
B. Procurement of material	30 days
C. Casting of cubes (800 in no.)	365 days
D. Casting of beams (400 in no.)	365 days
E. Casting of cylinders (400 in nos.)	365 days
F. Testing of cubes and beams	500 days
G. Observation, results and analysis	60 days
H. Preparation of reports	90 days
Total duration	**2 years**



List of facilities that will be extended to the investigator(s) by the implementing institution for the project.

INFRASTRUCTURE FACILITIES (TICK THE APPROPRIATE BOX)

Item	Yes	No.	NR
a. Workshop facilities	✓	☐	☐
b. Water & electricity	✓	☐	☐
c. Standby power	✓	☐	☐
d. Laboratory space & furniture	✓	☐	☐
e. Air-conditioned room for equipment	☐	☐	✓
f. Telecommunication	✓	☐	☐
g. Transportation	✓	☐	☐
h. Administrative & secretariate support	✓	☐	☐
i. Library facilities	✓	☐	☐
j. Computational facilities	✓	☐	☐
k. Animal	☐	☐	✓
l. Any other	☐	☐	☐

NR: Not Required

AVAILABLE EQUIPMENT AND ACCESSORIES TO BE UTILIZED FOR THE PROJECT

Availability	Sr. No.	Name of equipment and accessories	Model & make	Remarks
a. Available within investigation group	1	Testing equipment (compression, flexural, etc., non-destructive testing m/c, vibrators, moulds, mixer, etc.)	Aimil	
b. Available in the investigator's dept.	2	N.A.	–	–
c. Available elsewhere in the Institution or in the region	3	Library	–	–
	4	Workshop facilities	–	–
	5	Local conveyance	–	–
	6	Computing facilities	–	–