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# Innovative Performance Based Procurement Procedures

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## Innovative contracting/ procurement procedures:

1. Performance-based lump-sum contracting procedures (PBLSC)
2. Geo-hazards & construction risk management and risk sharing procedures.
3. Pay equation & value engineering procedures.
4. A (cost)+B (time or other incentives) bidding procedures.
5. Lane, shoulder, airside rental procedures.
6. Construction and Maintenance warranties procedures.
7. Urgent/Emergency job order contracting procedures.

## Notes on Innovative contracting procedures

- Pay equations, value engineering and risk sharing procedures are useful tools to support collaboration and cost effectiveness.
- PBLSC have been used by: U.S FHWA, FIDIC, Donors, U.S & U.K civil engineering associations, European Development Fund, US COE; Federal Highway Administration, U.S state and local DOTs, among others .

## Lessons learned from recent use of construction and supervision PBLSC in Ecuador-2004

### Ecuador costal road rehabilitation (1138/OC-EC) :

- Monopoly of large contractors was reduced.
- Significant reduction of road construction and maintenance costs, allowing to reconstruct, rehabilitate and maintain 1300 km vs. the estimate output of 1000km.
- In a comparable case study of using a cost-plus contract to construct the 67.5 km road Puerto Cayo-San José-San Lorenzo-San Mateo financed by CAF with a unit cost of **over \$500,000 per km**, using PBLSC on projects financed by the IDB in the same location, enabled to reduce the reconstruction/ rehabilitation costs **to \$/km 40,000**.

## Lessons learned from recent use of construction and supervision PBLSC in Guyana-2004

- Airside rehabilitation works of the Cheddi Jagan International airport, including pavement, drainage and lights works, were completed within the estimated costs of the contract, using restricted night time to improve the only international runway of this country. The contract duration was extended from 17 weeks to 23 weeks mainly due to the late start of the works that pushed the construction period into the rainy season.
- Ongoing roads and bridges investment and maintenance projects have used value engineering to avert cost overruns. In comparison, previous cost-plus contracts had suffered cost overruns of 30% to 63% on construction contracts and much more on supervision contracts.

# Engineering tools for designing cost effective road improvement projects

- Use the highway design and management program (HDM-4) for road investment projects; *construction, improvement, rehabilitation or reconstruction and periodic maintenance works.*
- Use the routine maintenance management system (RMMS) for road maintenance projects.
- Use a quantitative road safety strategy program, including accident reduction factors, to improve traveling safety, *see examples from Guyana-2004 and the World Bank-2009.*

## How to ensure sustainable benefits of road maintenance program using the RMMS

- The RMMS supports the administration (planning, design, and supervision) of routine maintenance activities to achieve optimum results under budget, social and environmental constraints.
- Under such constraints, the RMMS determines the annual (network level) and weekly/monthly (project level) of routine maintenance expenditures and work programs. The first priority is given to highway safety activities, and then to drainage activities, and finally, if affordable, to the quality of road performance.

**The Baku (Azerbaijan) -Ceyhan (Turkey) pipeline, (Picture from the Samtskhe Javakheti region- Georgia)**





## Baku -Ceyhan petroleum pipeline

- British Petroleum constructs the Baku (Azerbaijan) to Ceyhan (Turkey) petroleum pipeline, using lump-sum contract procedures, including A=construction cost + B=Time factor equivalent cost bidding procedures, with local contractors and international contractors such as Bechtel.
- The pipeline is designed to resist **earthquake activities of the magnitudes of 8 to 9** according to the Richter scale, considering 2 repetitions of these seismic magnitudes.
- The EBRD is one of this project's financiers.

## Using PBLSC and micro-enterprises for rural road maintenance works in Perú, 1998-2006

- Approximately 25,000 km of rehabilitated rural roads have been maintained, in the poorest Peruvian provinces, by approximately 650 micro enterprises, using PBLSC and providing labor-intensive maintenance works.
- The vast majority of the roads are accessible all year round and the annual maintenance cost is approximately \$500 to \$900/km/ year.

## Donors Lessons Learned:

- **Cost-plus contracts in many developing countries have transferred most or all of the risks to the public sector. The use of performance based lump-sum construction, maintenance and supervision contracts - is a good mechanism to share Geo-Hazards and construction risks and to restrict cost overruns. Recent examples include the Ennery Bridge reconstruction bridge in Haiti and the rehabilitation of 40 schools in Jamaica**

# Issues related to management of Geo-Hazards

- Seismic forces, heavy rainfalls, inadequate surface and sub-surface drainage facilities aggravate the frequency and severity of infrastructure damages caused by slope erosion (Gullying); mud and debris flows; Rock/ Scree falls; landslides and flooding.
- **Flooding is the most significant source of infrastructure damages, it caused about 72% of the damages in Peru between 1995 and 2003.**
- Comprehensive designs, monitoring procedures, and timely supervision significantly reduce Geo-hazards damages. However, repeatedly they are not available. Examples: Ecuador-Cuenca-Molleturo; Peru-Aguatia-Puente Chino.
- Technology and proper QC/QA procedures significantly reduce Geo-hazards damages. However, often they are not used.

## Risk sharing procedures of Geo-Hazards (incentives for collaboration)

- Define in the contract who, when and to what extent is responsible for the preparedness, mitigation and the remediation works.
- Example, for possible flooding damages caused by el Niño phenomenon: Define the responsibility of each party, including the road agency, the civil defense department and the contractor (Ecuador, Peru).
- In case of non-compliance of one party, the contract specifies when and what the other parties must do to avoid damages.

## Risk sharing procedures of Geo-Hazards (incentives for collaboration)-continue

- The contract rewards initiatives of collaboration; the contractor receives additional compensations when he assumes the responsibility of the civil-defense department to mitigate flooding risks outside the road right of way (ROW). However, the contractor must show that flooding was imminent.
- The contractor receives additional compensations when he uses state of the art technology to monitor possible Geo-hazards and when he produces cost effective preparedness works of slop stability, river training and flood preventions.

Does the cost-plus contract modality play an important role of cost overruns and Implementation delays?

Yes , when contractors and supervisors do not have incentives to support cost reliability or cost effectiveness, when risk sharing procedures are not clear, and when a proper code of ethics is not enforced.



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## How can performance based-lump-sum contracts (PBLSC) support cost reliability and cost effectiveness ?

- **PBLSC provides incentives and encourages collaboration of all stakeholders and especially, contractors and supervisors.**
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- **PBLSC shifts the reduced civil works cost overrun risk to the contractor that has a greater ability to manage that risk.**
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- **PBLSC promotes stakeholder partnership culture: agency, users, affected communities and therefore supports higher standards of ethics.**



# Benefits of using Innovative Contracting Procedures

- Traditionally infrastructure projects are design, bid, and built with the contract **awarded to the lowest \$ bidder.**
- Innovative contracting allows for additional factors such as less time, better quality, less claims and more other services to be considered **in addition to the lowest \$ bid for a given quality of service.**

## A + B Bidding

- Definition: A cost plus time bidding procedure that **selects the low bidder** based on a monetary combination of the contract bid item and the time (B) needed to complete the entire project or the critical portion of the project.

## Benefits of A + B Bidding

- The A-construction cost and the B-equivalent cost factor are included in the competitive procurement procedure of the construction or maintenance works.
- A+ B bidding is used to motivate the contractor to minimize the overall time on high priority and high usage projects. This encourages contractors to finish early by:
  - offering bonuses for early completion.
  - Assessing fines for late completion.

## Justifications for using A + B contracting procedures on road projects

1. Where traffic restrictions, lane closures or detours result in high user costs.
2. Where safety concerns, or significant impacts to the local community, during construction warrant expediting the project.
3. Where effective traffic management can maximize contractor's ability to reduce construction time.

## Justifications for using A + B contracting procedures on road projects

4. Where the project is relatively free of third party conflicts (land acquisition, resettlement, utilities).
5. Where the public is interested to complete the project as soon as possible.
6. Examples: Indiana-USA, using road users cost of \$20,000/day; Peru and the Bahamas have considered using A + B contracting in Lima and in Nassau.

## Value engineering & pay equations

- Recognize that non-homogenous soils and materials characteristics are unavoidable and affect quality, performance, user's, construction and maintenance costs of infrastructure.
- Agencies adjust the payment according to the actual level of quality received and the time of product delivery (pay equation).
- Example: The FHWA uses value engineering and pay equations in its general specifications to address non-homogenous characteristics of asphalt mixtures, and to promote quality pavement performance .

## Construction and Maintenance warranties procedures.

- Highway rehabilitation/reconstruction warranties are issued for a specific product or work item such as the asphalt pavement.
- **Warranties are usually issued for a period of 2 to 5 years and are only for items over which the contractor has full control.**
- Example :Warranties for preventing of pavement failure such as rutting, roughness or fatigue cracking: **YES.**
- Example: Warranties for preventing excessive road surface deflection (FWD, BB): **NO.**

# Advantages of using contracting warranties

- **Less agency or owner risks.**
- Reduces or eliminates agency costs for quality control personnel by making the contractor responsible.
- **Creates incentives to contractors and consultants to improve the overall project quality.**



## Lane/ shoulder/ airside runway rental

- **Definition:** An innovative contracting technique by which a contractor is charges a fee, not a fine, for occupying the runway, road-lanes or shoulders to do contract work.
- **Benefit:** motivate the contractor to minimize the time that a lane, shoulder, or a combination of both are out of service with a significant impacts to the users.

## Justifications for using Lane rental uses

- Where traffic restrictions or lane closures result in high user costs.
- Where project is free of third party conflicts (ROW, utilities, social/environmental)
- Where **a traffic control plan** allows the contractor flexibility in works scheduling to minimize the impact of lane or runway closure.

## Justifications for using Lane rental uses

- Where the agency seeks contractor expertise to minimize the time that lanes are out of service.
- Where the use of alternative routs or detours is impractical.
- Where the benefit of the reduced negative impact to the users is greater than the additional cost to minimize the time for the lane closure.

## How are lane charges calculated?

- Charge for lanes or shoulders can be either, hourly rate or daily rate.
- Charges per lane can vary from zero to high costs, depending on time of day, amount of traffic, and other user costs.

# Urgent/Emergency job order contracting

- Definition: The combining of many contracts or many urgent works into one administered by one project team.
- The projects are competitively bid, indefinite quantity, indefinite delivery and fixed unit prices.

## How is urgent job order contracting different from traditional contracts?

- They may cover all types of works, construction, repair, maintenance and rehabilitation of different facilities (roads, bridges, seawalls, docks, water supply etc.) under a single contract of fixed unit costs.
- The contracts are in place before the design completion of the emergency works.
- Quality indicators are more flexible, Roads: shorter project expected life expectancy ELE, higher roughness (IRI) and rutting values (Ecuador, after el Niño: the pavement ELE was 3-5 years, and the IRI of 2.5-3.9 m/km).

# Innovative Performance Based Procurement Procedures

## Ten Ideal contractual characteristics

1. Where the contract includes comprehensive and detailed designs aimed at achieving cost effective, cost reliable (within 5-10% of actual costs), affordable and achievable results.
2. Where a supervisory firm with adequate experience of administering lump-sum contracts is used.
3. Where sufficient time is available for the contractor to review/revise and accept the design and the construction responsibilities, Example, Guyana: The selected contractor is compensated in full and the successor bidders receive up to 65% of the design review cost item of the selected contractor.

# **Innovative Performance Based Procurement Procedures**

## **Ten Ideal contractual characteristics**

- 4. Where a mandatory participation of all stakeholders in a pre-contract signature conference is required, to discuss the specific lump-sum characteristics of the project.**
- 5. Where the selected contractor certifies, before the contract signature, that there are no known errors or omissions in the contract documents.**
- 6. Where risk sharing procedures are defined in the contract.**
- 7. Where specific bonus and penalty clauses, for both quality and schedule, are defined in the contract.**





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**Thank you very much**  
**Any questions?**

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