2006-B0035
Distributed @ CBC meeting
of 3-15-06

Brightwater Project
Oversight Quarterly Report

Presentation to the Budget and Fiscal Management Committee

Bob Bingham, P.E.
Phil Helmes, P.E.
Pat Marchese, P.E.
March 15, 2006

Brightwater Oversight Consultant Quarterly Report for March 2006

- Background
- Trend Estimate: Key Issues
  - Treatment Plant Costs/GCCM Process
  - Inflation
  - Project Contingency
- What's Ahead?

Background: *Oversight Consultant Team*

- **R. W. Beck** – Over 50 years providing independent engineering oversight and advice to utilities and financial institutions. Advises clients on alternative project delivery, including GC/CM and Design-Build.
- **Charles River** – Specializes in review of major capital projects and programs. Focus on management and construction issues impacting program budget and schedule.
- **PTM Consulting** – Provides peer review of wastewater utility capital improvement programs and facility operations

Background: *Conclusions re Costs From Previous Oversight Report to Council*

1. Proposed baseline budget of $1.48 Billion ($2004) is likely 5-6% low overall and does not include inflation.
   - Several risk factors were identified for 30% construction cost estimate.
   - Contingencies on low-end of industry experience, do not cover all risks, and do not incorporate the cost to "develop" the design.
2. Baseline budget modifications were not recommended to reinforce the need for aggressive program management to control costs.

Background: *Conclusions re Risks from Previous Report to Council*

Risk Factor Identified in Previous Report (POR)	Actions Taken / Oversight Consultant Observations
Degree to which 30% Construction Cost Estimate Relied on Allowances	• GC/CM's 60% estimate substantially reduced the number of line items based on allowances. Where allowances continued to be used in the 60% estimate, the nature and scope of those allowances was better defined. • Overall, this risk has been reduced but not eliminated.
MBR Technology Scale-up – Brightwater will be largest MBR plant in the U.S.	• Qualified vendor selected • Brightwater designer has gained additional design experience with larger MBR plants which reduces risk, but limited operating experience with larger MBR plants continues to be a risk factor.
Odor Control	• $18.9M additional costs ($2004) between 30% and 60% design. • At 60% design, WTD conducted independent peer review. • Peer review indicated design should be able to meet WTD's odor control performance commitments, but the ultimate test will come once the plant is operating. $3M in operating reserves in the event additional controls are required is prudent.
Seismic Concerns at Treatment Plant Site	• Additional seismic studies and supplemental EIS drove up costs for a variety of TP features due to building relocations and additional seismic protections. • Snohomish County is requiring additional trenching at chemical storage building which will not be completed until May 2006 – remains a cost risk factor. • 60% Treatment Plant estimate includes increased allowances for rebar – remains a cost risk factor because structural details will not be developed until 90% design. • Overall, cost risk is reduced relative to where it was at 30% design.

Background: *Conclusions re Risks from Previous Report to Council (continued)*

Risk Factor Identified in Previous Report (POR)	Actions Taken / Oversight Consultant Observations
Building Code/Siting Issues at Treatment Plant	• Snohomish County mitigation agreement resulted in $50.5M additional costs ($2004) but includes commitments from the County with respect to permit application review times. • Most federal permits obtained; local permitting to be completed. • Overall, cost and schedule risks are reduced because there is more permitting certainty and agreement with Snohomish County.
Unforeseen Tunnel Conditions	• Used Geotechnical Baseline Report to establish clear basis for managing risks. • Prescribed tunnel boring machine for high risk Central Tunnel • Risk assessments and contingency plans updated quarterly • WTD is conducting extensive peer review of tunnel designs • Overall, WTD is taking a proactive and thoughtful approach to managing tunneling risks.
New-to-County Contracting Methods (GC/CM and Design-Build)	• Hoffman is a proven GC/CM Contractor. Construction Management support firm (CDM) has GC/CM experience. • Competitive process to facilitate subcontractor bidding in GC/CM Contract – Implementation will be monitored by Oversight Consultant.

Background: *Key Management Issues*

Areas for Improvement Identified in Previous Report (POR)	Current Status / Oversight Consultant Observations
Develop collaborative relationship between Treatment Plant designer and GC/CM	• Value Engineering (VE) process was implemented to ensure common understanding and constructability of design and to reduce costs. • Improved collaborative relationship observed by Oversight Consultant.
Add "Design to Construction Budget" objective to Treatment Plant designer contract.	• WTD amended designer contract to require that designer identify changes with potential to significantly increase cost. • Designer and GC/CM working together to provide "early warning" of potential cost increases and provide WTD with the information needed to actively manage those issues.
Address potential duplication of effort between GC/CM and Treatment Plant Construction Manager	• WTD held workshop with Oversight Consultant to help define objectives for CM and GC/CM roles. Roles and responsibilities are being defined in more detail in construction staffing plans. • Oversight Consultant to evaluate construction staffing plans once completed to validate whether areas of potential overlap have been sufficiently addressed.
Final GC/CM contract should include specific requirement to enhance subcontractor bidding.	• Competitive subcontractor bidding requirements included in GC/CM Contract. • Implementation will be ongoing issue monitored by Oversight Consultant

Background: *Key Management Issues (continued)*

Areas for Improvement Identified in Previous Report (POR)	**Current Status / Oversight Consultant Observations**
Integrate Treatment Plant and Conveyance scheduling	• WTD coordination group formed – working with in-house schedule. • Regular meetings focus on coordination and key project elements. • WTD has initiated development of system-wide start up planning. • Overall, this issue is being managed by WTD but ongoing integration will remain an important issue.
Delegate down construction change order approval authority.	• WTD has initiated this for conveyance. Will be developed as part of Construction Plan for Treatment Plant. • Addressing this issue is important to avoid costly bottlenecks and delays during construction.

Ongoing Oversight Consultant Review Process

- Observe Project Progress Meetings
- Interviews of Brightwater Staff
- Management Review of Design Documents
- Review Brightwater Monthly Reports
- Review Schedule Updates
- Review Cost Updates and Trend Reports
- Consider Information from Comparable Projects
- Oversight Role Extended for First Two Years of Construction

2005 Trend Estimate: Information Reported by WTD

Brightwater Component	October 2004 30% Design Estimate (2004$)	December 2005 Trend Estimate (2004$)	Difference over/(under) (2004$)
Treatment Plant	$426.4	$515.9	$89.4
Conveyance	$869.7	$832.7	($34.1)
Land/ROW	$98.9	$97.5	($1.4)
Mitigation	$88.0	$138.5	$50.5
Total	**$1,483.1**	**$1,584.6**	**$101.5**

(6.8% increase based on $2004)

* Costs are in millions of dollars; totals may not add due to rounding.

Current Trend Estimate – *Items Reviewed by Oversight Consultant*

- Changes in Construction Cost Relative to Baseline Budget ($2004)
    - Expectations for change with progression of design development given industry norms
    - Major drivers of cost changes
    - WTD efforts to manage "controllable" costs
    - Contingencies
- Allied Costs
- Inflation
- Look Ahead to Upcoming Cost Information

Review of Current Trend Estimate

	TP Baseline ($2004)	TP Current Trend Est. ($2004)	Conveyance Baseline ($2004)	Conveyance Current Trend Est. ($2004)
Construction	**$259.4**	**$338.1**	**$511.9**	**$477.9**
Sales Tax	$21.8	$27.0	$57.0	$53.9
Allied Costs	**$89.1**	**$94.6**	**$172.8**	**$174.1**
Art Allowance	$4.3	$4.3	$0.1	$0.1
Contingency	**$51.9**	**$51.9**	**$128.0**	**$128.0**
Land	$82.3	$85.0	$16.6	$12.5
Mitigation	$61.2	$118.9	$26.8	$19.6
Total	**$570**	**$719.8**	**$913.2**	**$866.1**

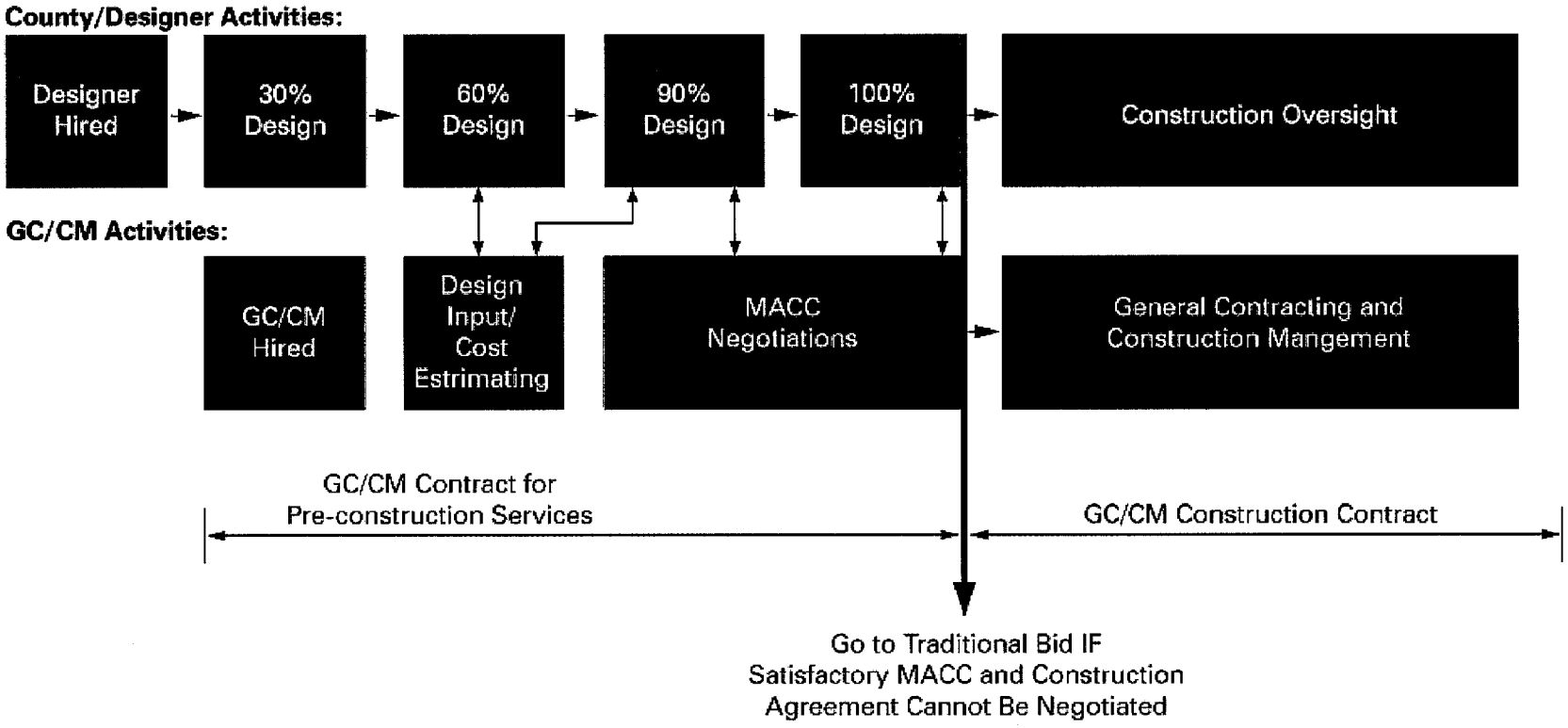
Red = Evaluated by Oversight Consultant

Treatment Plant Construction Cost ($2004)

30% Design Estimate	Trend Estimate (60% Design)	100% Design / MACC
$259.4M	$338.1M	??

- POR estimated there would be a 25% increase from 30% to 100% design based on industry norms.
- Construction cost estimate prepared by GC/CM at 60% design is more detailed and robust than 30% design estimate. Costs have also been influenced by local heavy construction market which currently does not favor the County.
- 60% design estimate is within the range predicted by Oversight Consultant, but it is impossible to tell if MACC will be higher or lower since progression from 60% estimate to MACC continues to carry some risk for market conditions and potential changes in scope.

Treatment Plant Construction Cost: GC/CM Issues



Treatment Plant Construction Cost: *Why GC/CM Approach was Selected*

Reasons to Select GC/CM	How Applied to Brightwater Treatment Plant Project
• Value in obtaining early input on construction costs and schedule from a contractor standpoint.	• Early input on costs, design, schedule, and constructability from Hoffman.
• More meaningful Value Engineering (VE) process.	• Input from Hoffman solicited throughout VE effort both on cost and constructability.
• Challenging site and construction issues.	• Input from Hoffman provided regarding geotechnical/seismic issues
• Reduces potential problems with "low bid" (i.e. change orders, poorly qualified contractor).	• Hoffman is well qualified contractor with demonstrated history of few change orders on other major civil GC/CM projects (i.e. Everett).

Treatment Plant : *Potential GC/CM Issues*

GC/CM Issues	Oversight Consultant Observations
• GC/CM does not necessarily lower costs relative to traditional design-bid-build but can give earlier cost certainty and provides better transparency re subcontractor bids.	• For most projects, MACC has provided upper limit on costs, but number of wastewater treatment projects delivered using GC/CM in Washington is limited. • In an uncertain market environment, owners will tend to get better price if MACC is based on 100% design because there are fewer $ in MACC to cover inflation risk.
• MACC is not equivalent to a bid and can be higher because GC/CM contractor carries more risk for "buyout" (subcontractor bidding) phase.	• Ultimately, MACC may be higher than competitive bid **BUT** the GC/CM is not paid the MACC – GC/CM is paid the amount the project costs provided it is lower than the MACC. • We are **NOT** at MACC yet, and costs could increase again due to additional detailing and changes in scope between 60% and 100% design.
• MACC is typically considered to limit upside risk rather than drive to lower cost.	• Ultimate GC/CM costs are more dependent on effective subcontractor bidding program than on low MACC. • Typically there are fewer surprises during construction (and fewer claims and change orders) due to better transparency with respect to cost.
• Contractor markups: → 30% design estimate set at 25% → Hoffman 60% estimate set at 35%	• Will be a MACC negotiation item

GC/CM Looking Forward

- MACC negotiations
  - Cost/risk relationships
  - Financial incentives/sharing the savings provisions
  - Overheads
  - Inflation risk
  - OR, competitively bid if unable to reach agreement in MACC.
- Bid package development
- Self-performed work
- Competitive subcontractor bidding process
  - Outreach
  - Require minimum number of bids
  - County administered bidding for self-performed work

Treatment Plant Construction Costs

Plant Elements with Major Increase from 30% to 60%	Increase ($2004)	Reasons
Odor Control	$18.9 M	• Updated equipment quotes from suppliers • Duct work – quantity and pricing increases • Previously identified as high cost risk feature by Oversight Consultant
Primary Clarification	$12.3 M	• Allowances at 30% design too low • Equipment, steel, concrete price increases • Updated quotes from suppliers
Aeration Basin	$11.8 M	• Updated quotes from equipment suppliers • Aeration piping – quantity and pricing increases • Allowances at 30% design too low
Headworks and Truckload Out	$8.3 M	• Equipment, concrete and steel price increases • Electrical allowance too low • Cost transfer from previous estimate

Treatment Plant Construction Costs *(continued)*

Plant Elements with Major Increase from 30% to 60%	Increase ($2004)	Reasons
MBR Facilities	$6.7 M	• Fixed price bid at 60% design from MBR unit vendor reduces cost risk going forward. • On a percentage basis, MBR Facilities did not increase as much as other conventional process units because of smaller MBR's footprint which makes concrete / steel prices less of a factor.
Solids Building	$6.3 M	• Equipment and material price increases
Disinfection Building	$5.9 M	• Change in scope to provide separate building
Electrical Substation	$4.4 M	• Baseline budget assume repayment could be part of rates paid to SnoPUD. SnoPUD requiring payment of capital cost.

Note: Increased construction markups affected all Treatment Plant construction costs.

Treatment Plant – *WTD Efforts to Manage Costs to Date*

- Initial 60% design cost information from GC/CM indicated high costs
- WTD froze design and conducted VE with extensive input from GC/CM
    - Identified over 270 VE options
    - Identified potential cost savings
- Trend log process implemented subsequent to VE

Oversight observations regarding WTD efforts

- Approach was reasonable. Balance between cutting costs (about $50M from initial 60% estimate) and maintaining quality and treatment capability.
- Demonstrates value of GC/CM during design.

Conveyance Construction Cost – *Design Progression*

($2004)

Element	30% Estimate	Trend Estimate	Basis
East Tunnel	$127.7M	$121.3M	Bid and Contract Award
Central Tunnel	$226.7M	$182.5M	60% Design
West Tunnel	$84.3M	$85.5M	30% Design
IPS	$49.2M	$50.9M	30% Design
Outfall	$24.0M	$27.6M	30% Design
Total	**511.9**	**$477.9M**	

- POR estimated 15% increase between 30% and 100% design based on industry norms.
- So far international tunneling market conditions have favored King County.
- BUT, highest risk tunnel (Central Tunnel) has not been bid (bids are due April, 2006).

Should Project Contingencies Be Reduced At This Time? (trend estimate leaves contingencies at 2004 baseline levels).

- **No.** Contingencies were low at 30% design. Considering ongoing development of the design and reduced risk, contingency levels are now appropriate.
- Contingency adjustments may be warranted once tunnel bids are received and MACC for major Treatment Plant work is negotiated.

Trend Estimate – *Allied Costs*

Item	Baseline Estimate Cost (2004$)	2005 Estimate (2004$)	Reasons for Change
TREATMENT PLANT	$89 M	$94.6 M	• SEIS on Treatment Plant site seismic issues • Re-design due to VE at 60%
CONVEYANCE	$172.8 M	$172.8 M	

Oversight Consultant Observations:

•Allied costs for Conveyance portion of projects are generally comparable to other large municipal wastewater programs.

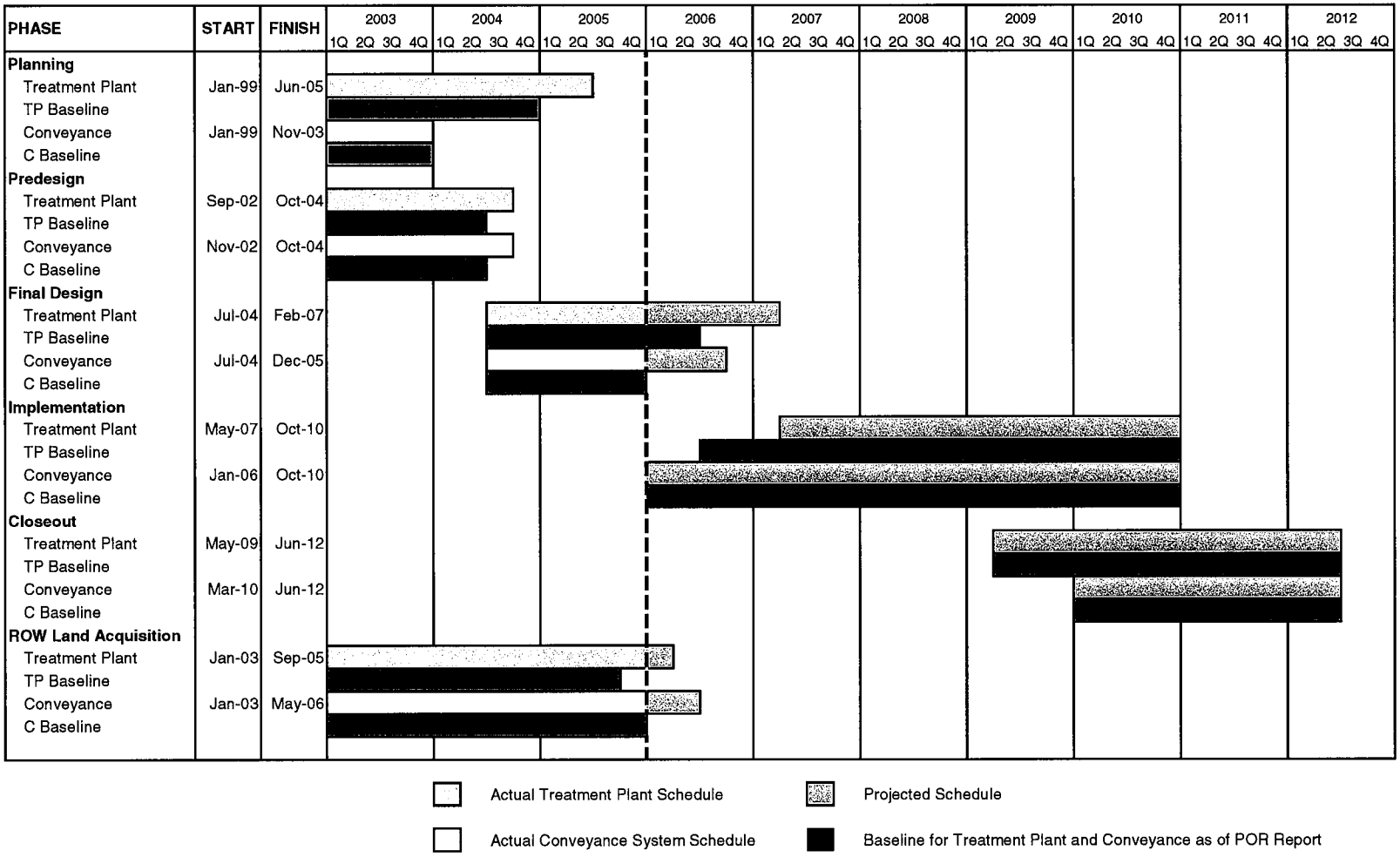
•Allied costs for the Treatment Plant portion of the project are higher than most other wastewater treatment facilities.

•Higher allied costs for the Treatment Plant portion of the project are due to SEIS as well as additional staff, consultant and GC/CM efforts for redesign, and additional VE and cost estimating.

Trend Estimate - *Inflation*

- To account for general inflation since 2004, estimates increased by $36.3M (4.1% annual increase from $2004 to $2005 applied to those items that would escalate).
- Inflation as reported by WTD in some cases included contractor markups in addition to general inflation.
- Oversight Consultant recommends reporting and tracking markups separate from general inflation.
- Market Conditions in NW and U.S.:
    - Local labor
    - Commodities
    - International tunneling

Schedule Status



Current Status

Current Status	**Conveyance**	**Treatment Plant**
• Design	88% complete	77% complete
• Permitting	90% complete	75% complete
• Construction Value in Bidding Phase	66% of construction cost	2% of construction cost
• Construction Value Under Contract	25% ($131M)	2% ($7.7M)
End of 2006 Expected		
• Design	98% complete	96% complete
• Permitting	98% complete	90% complete
• Construction Value in Bidding Phase	94% of construction cost	92% of construction cost
• Construction Value Under Contract	94% ($464.7M)	81% ($301.4M)

What's Ahead

Item	Expected Date
Treatment Plant 100% Design Submittal	October 2006
Treatment Plant Construction Starts	May 2007

Central Tunnel Advertised	January 2006
Portal 46 Grading and Noise Permits	April 2006
Central Tunnel Award	June 2006
Outfall Design-Build Contract Advertised	July 2006
West Tunnel Bid Date	July 2006
North Creek Facilities 90% Design Submittal	August 2006
IPS Bid Date	September 2006

Central Tunnel Cost Issues

- Market/Bidding Conditions
- High Hydrostatic Pressure
- Tunnel Boring Machine Technology
- Unbudgeted Risks (Not covered by contingencies)
    - Large boulders resulting in abandonment of TBM
    - Tunnel collapse
    - Uncontrollable water