University Transportation Research Center - Region 2

Final Report

Assessing Values to Non Strike Agreements in Construction Projects

Performing Organization: University Transportation Research Center - Region 2

November 2013

University Transportation Research Center - Region 2

The Region 2 University Transportation Research Center (UTRC) is one of ten original University Transportation Centers established in 1987 by the U.S. Congress. These Centers were established with the recognition that transportation plays a key role in the nation's economy and the quality of life of its citizens. University faculty members provide a critical link in resolving our national and regional transportation problems while training the professionals who address our transportation systems and their customers on a daily basis.

The UTRC was established in order to support research, education and the transfer of technology in the field of transportation. The theme of the Center is "Planning and Managing Regional Transportation Systems in a Changing World." Presently, under the direction of Dr. Camille Kamga, the UTRC represents USDOT Region II, including New York, New Jersey, Puerto Rico and the U.S. Virgin Islands. Functioning as a consortium of twelve major Universities throughout the region, UTRC is located at the CUNY Institute for Transportation Systems at The City College of New York, the lead institution of the consortium. The Center, through its consortium, an Agency-Industry Council and its Director and Staff, supports research, education, and technology transfer under its theme. UTRC's three main goals are:

Research

The research program objectives are (1) to develop a theme based transportation research program that is responsive to the needs of regional transportation organizations and stakeholders, and (2) to conduct that program in cooperation with the partners. The program includes both studies that are identified with research partners of projects targeted to the theme, and targeted, short-term projects. The program develops competitive proposals, which are evaluated to insure the mostresponsive UTRC team conducts the work. The research program is responsive to the UTRC theme: "Planning and Managing Regional Transportation Systems in a Changing World." The complex transportation system of transit and infrastructure, and the rapidly changing environment impacts the nation's largest city and metropolitan area. The New York/New Jersey Metropolitan has over 19 million people, 600,000 businesses and 9 million workers. The Region's intermodal and multimodal systems must serve all customers and stakeholders within the region and globally.Under the current grant, the new research projects and the ongoing research projects concentrate the program efforts on the categories of Transportation Systems Performance and Information Infrastructure to provide needed services to the New Jersey Department of Transportation, New York City Department of Transportation, New York Metropolitan Transportation Council , New York State Department of Transportation, and the New York State Energy and Research Development Authorityand others, all while enhancing the center's theme.

Education and Workforce Development

The modern professional must combine the technical skills of engineering and planning with knowledge of economics, environmental science, management, finance, and law as well as negotiation skills, psychology and sociology. And, she/he must be computer literate, wired to the web, and knowledgeable about advances in information technology. UTRC's education and training efforts provide a multidisciplinary program of course work and experiential learning to train students and provide advanced training or retraining of practitioners to plan and manage regional transportation systems. UTRC must meet the need to educate the undergraduate and graduate student with a foundation of transportation fundamentals that allows for solving complex problems in a world much more dynamic than even a decade ago. Simultaneously, the demand for continuing education is growing – either because of professional license requirements or because the workplace demands it – and provides the opportunity to combine State of Practice education with tailored ways of delivering content.

Technology Transfer

UTRC's Technology Transfer Program goes beyond what might be considered "traditional" technology transfer activities. Its main objectives are (1) to increase the awareness and level of information concerning transportation issues facing Region 2; (2) to improve the knowledge base and approach to problem solving of the region's transportation workforce, from those operating the systems to those at the most senior level of managing the system; and by doing so, to improve the overall professional capability of the transportation workforce; (3) to stimulate discussion and debate concerning the integration of new technologies into our culture, our work and our transportation systems; (4) to provide the more traditional but extremely important job of disseminating research and project reports, studies, analysis and use of tools to the education, research and practicing community both nationally and internationally; and (5) to provide unbiased information and testimony to decision-makers concerning regional transportation issues consistent with the UTRC theme.

Project Date: December 2013

Project Title: Assessing Values to Non-strike Agreements in Construction Projects

Principal Investigators: Dr. Camille Kamga, Dr. Robert E. Paaswell, Dr. Jonathan Peters

Performing Organization: The City University of New York (CUNY)

Sponsor: Brown and Weinraub, PLLC

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Assistant Professor of Civil Engineering, CCNY

Dr. Robert E. Paaswell: *Director Emeritus of UTRC and Distinguished* Professor of Civil Engineering, The City College of New York

Herbert Levinson: *UTRC Icon Mentor, Transportation Consultant and Professor Emeritus of Transportation*

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Nathalie Martinez: *Research Associate/Budget Analyst*

ASSESSING VALUES TO NON-STRIKE AGREEMENTS IN CONSTRUCTION PROJECTS

CAMILLE KAMGA, ROBERT E. PAASWELL, JONATHAN PETERS

SPONSOR: BROWN AND WEINRAUB, PLLC

DECEMBER 2013

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EXECUTIVE SUMMARY

This study represents the state of good practice economic theory and models and concludes that there is, indeed value to non-strike agreements in construction projects. Certainly, every major construction project – especially public projects that must go through rigorous Benefit Cost Analyses to gain funding – has an intrinsic value to its owner. However, as is well documented in construction work, all projects have elements of risk. In fact the levels of risk are included in both the owner's budget and in the contractor's estimate. Risk (or contingency) is an attempt by each to quantify the unknown. Certainty of labor agreements is one means of reducing the unknown factors of risk. The literature- and experience – show that labor stoppages can have significant cost impacts – not only to the given project, but also to conditions external to the project. Thus, labor agreements; such as Project Labor Agreements (PLA) have been adopted to minimize the probability of labor disruptions. The report shows – using case studies and economic theory – that there is an added value to each side – the owner and labor – in participating in such an agreement, including a no strike agreement. Through case studies, the researchers show the value of such agreements and present a simple model to be used for similar cases.

It is important to note that each construction job is unique; each agreement would be unique. Local environment, construction seasons, type of construction, local codes, local labor agreements all reinforce such uniqueness. However, the broad premise that each job has an intrinsic value – that incorporates risk – is true for all projects.

MODEL DESIGN AND SPECIFICATIONS

The UTRC developed a functional model to estimate the potential impact of a project labor agreement (PLA) on project costs and risk. The model was developed to estimate the overall impact of various factors on project costs and overall project return. The factors include the cost side of a project as well as estimated revenue and penalty clauses for a given project.

Construction projects are in generally heterogeneous in scope, costs and project details –due to the nature of civil engineering projects in general. Therefore, to estimate the value (or cost) of various project impacts, one must consider the unique aspects of the project under review. To provide some context, the generic conditions of a construction job costs could be described as follows:

- **Labor inputs from various trades** – general labors, ironworkers, carpenter, dock builders and such.
- **Capital inputs of various types** – cranes, excavating equipment, rollers, tunneling machines and such.
- **Inputs in terms of physical products** – steel, rebar, concrete, timber, framing, decking and such.
- **Construction temporary items** – cofferdams, temp paving, temporary supports and such.
- **General operating conditions** – location, access roads, mobilization, moving costs and such.
- **Construction technology** – permissible techniques for a given region.

On the non- construction side of the project, one considers a number of factors as well. These can include:

- **Project revenue** – potential revenue by source over time
- **Interest and carry costs** – cost of financing the project
- **Market conditions in financial markets** – Conditions of borrowing and market taste for risk
- **Penalty clauses** – contract aspects that will reward or punish owners if project is delayed.

The model is developed in Microsoft Excel and can be modified as needed to reflect the various components of cost and revenue as they are specified in the project. These costs and revenues are specified with a given probability of occurrence based upon the expected project outcomes. In the baseline model, the researchers specify a model that has three potential states of labor unrest. They are as follows:

- Outcome A – No Labor Disruption
- Outcome B – Minor Labor Disruption
- Outcome C – Major Labor Disruption

Additional scenarios could be modeled as needed. Each labor scenario has an attached probability of outcome. These outcomes are modeled as being mutually exclusive (only one scenario occurs) and collectively exhaustive (one of these events must occur for our project).

The model evaluates the various outcomes over the practical time horizon for the given project. The practical time horizon is defined in this study as being the relative construction period and the appropriate time horizon for the project valuation. In the examples – the researchers considered the 5 to 20 year period as this represents a valid time for analysis in the case study. Two types of projects are represented – a highway project and a residential rental building. Some projects may have longer construction periods and also may have longer time horizons to consider. Individual analysis of these parameters should be considered in detail for a given project if accurate estimates of true costs are needed.

Project costs and revenues are discounted back to a present value based upon appropriate discount rates for the project under consideration. Discount rates vary be project, project funding, overall risk, potential revenue risk and other factors. As in all financial analysis, key assumptions in this area should be considered in light of various aspects of risk and return. Using the appropriate discount factors allows the researchers to compare the current (present) value of the various costs and revenue. Taking present values allows one to compare the total "package" of value that is created by the project at a single point in time (the decision point – which is today) so that the owners and labor can consider the value at risk in the project.

The various present values are then weighted by the relative likelihood of occurrence. The project labor agreement has the ability to alter the relative probability of the various labor unrest outcomes. By executing a Project Labor Agreement (PLA), the owners of a given project can "purchase" better labor conditions – with more reliable labor work conditions, limited jurisdictional disputes, a no strike clause for all covered labor and a labor dispute resolution procedure. The executed PLA reduces the probability of the major and minor disruption and increases a likelihood of the no disruption outcome.

Flowing these changes through the model alters the relative costs and return of the expected project. The expected value for the project is the sum of the present value of the various outcomes for each set of collectively exhaustive outcomes. In the case study, the Pre PLA (higher strike and labor unrest) and the Post PLA outcomes (lower strike and labor unrest) are used as the two collectively exhaustive outcomes. Comparing the expected value of each outcome allows users to compare the value of various outcomes.

Project owners, contractors and labor groups can utilize the tool to create various scenarios of value that can be evaluated and the various entities can work towards a negotiated PLA that delivers the level of value that is desired by the parties at the table. Owners with high value (high revenue) may wish to bargain for a strong PLA with higher restrictions on labor unrest and pay for this with better working conditions for labor (pay or contract terms). Project with low owner value or little value from early project delivery will create conditions where owners will be resistant to agreeing to excessive labor terms to execute a PLA.

Projects with high levels of capital and low levels of labor in the project will create conditions where owners will be interested in a low strike condition, as the cost of project labor disruption is high in terms of total project costs (capital + labor costs) and the costs to have a PLA are moderate – as we only adjust the terms on the labor component – not the capital component.

Further development of the model is possible and given projects could be evaluated as needed. Users should exercise caution in model application and consider carefully project assumptions and costs.

The following sections present the case studies and results of the models.

Assessing Values to Non Strike Agreements in Construction Projects

UNIVERSITY TRANSPORTATION RESEARCH CENTER

C. KAMGA, R. PAASWELL, J. PETERS

Final Report November 2013

Final Report

- Report Findings and Conclusions
- Model Description
- Case Studies - Project Descriptions
- Appendices - Interim Reports
  I. Background on Issues and Costs
  II. PLA as Financial Derivatives
  III. Project Update 10/18/13

Findings and Conclusions

FINDINGS

- Labor unrest/stoppage as risk factor
- Risk impacts project two ways
  - Contractors include risk in bid price
  - Labor unrest/stoppage adds costs to projects outside contractor contingency

Impact of Labor Unrest/Stoppage on Construction Project

- Project Delays
  - Duration of action
  - Ongoing - Literature shows that there is a 20% cost escalation due to strikes.
- Project Delay Costs
  - Contractor
  - Owner
  - User
  - Society (public)

Cost of Labor Unrest/Stoppage

- Owner Loss of Revenue
  - Buildings
    - Private – Lost Rentals/Sales
    - Public – Cost of Alternative Office/Dormitories
  - Highway Bridge & Toll Facilities

Cost of Labor Unrest/Stoppage

- Owner/Contractor Costs
  - Capital Costs
  - Financing Costs
  - Project Costs
    - Productivity Losses
    - Oversight Costs
  - Delay in Realizing Project Benefits

Cost of Labor Unrest/Stoppage

- User Costs Highway and Bridge Projects
  - Drivers
    - Time Cost of Delay
    - Cost of Fuel for Detours
    - Cost of Accidents
      - Property
      - Injury

Cost of Labor Unrest/Stoppage

- Societal Costs
  - Pollution
  - Injuries
  - Lost Productivity

Findings

- Threat of Strike is Real
  - Nationally stoppages impacting 1,000 more workers average 1.8 actions annually lasting 6 days over last 10 years
  - Smaller actions and jurisdictional disputes more common

Findings

- Project labor agreements mitigate risk of labor strike/disruption
  - No Strike clauses
  - Jurisdictional dispute resolution
- Literature shows PLA reduces productivity loss due to work stoppage
- Other benefits in addition to above - not part of study

PLA Evaluated as Financial Instrument

- Are they a Futures Contract?
- Are they an Options Contract?
- Are they a Futures Option?

- Option – Right to purchase or sell at a given price but not the obligation – buyer has option and pays premium
- Futures Contract – double binding contract on buyer and seller that set price of future commodity transaction based on negotiation of price today.

Calculating the Benefits of PLA

- Model developed for Building Project and Highway and Bridge Project
- Similar to Financial Model for futures/options contracts

Model

- Costs of Delay calculated using factors described above
- Probability of stoppage with and without PLA established
- Value of reducing risk calculated

Model

- Run for both Building project (College of Staten Island Dormitory) and Highway and Bridge Project (Thruway new lane between exist 23 and 24)
- Value of PLA demonstrated

Conclusion

- Strikes/Labor disruptions a documented risk in construction projects
- Labor unrest delays project beyond time of stoppage
- PLAs reduce risk of stoppage
- Value in PLA no strike provision

Strike Costs Model

Model Specifications and Operations

Example - Building Project

From

The Owner and Contractor

Perspective

Spreadsheet Model Components

PLA Value Estimation - Project Example

Jonathan Peters - College of Staten Island - CUNY

10-Oct-13

Assumptions	
4 Year Project	Interest rate = 8%
Labor Unrest can be Eliminated by PLA	Project can be partially
	delivered to owner for use
Labor Costs are 25% of Total Project Costs	
18 Months Construction under No Labor Disruption	
Cost for Late Delivery - there is a Penalty Clause in contract to provide alt facility	

Rate of Return Assumptions	1	2	3	4
	Year 1	Year 2	Year 3	Year 4
Interest Rate	0.08	0.08	0.08	0.08
1+i	1.08	1.08	1.08	1.08
FVIF	1.08	1.1664	1.259712	1.360489

Owner Perspective		2014	2015	2016	2017
Without Penalty Clause		Future Cash Flows			
Pays Construction Cost and Collects Revenue from Project		Year 1	Year 2	Year 3	Year 4
No Labor Disruption	A	$ (24.00)	$ 31.00	$ 45.00	$ 45.00
Minor Disruption	B	$ (20.00)	$ 7.00	$ 22.00	$ 45.00
Major Disruption	C	$ (12.00)	$ (12.00)	$ (11.00)	$ 45.00

		Present Value of Scenario				
		Year 1	Year 2	Year 3	Year 4	Total NPV
A		$ (22.22)	$ 26.58	$ 35.72	$ 33.08	$ 73.15
B		$ (18.52)	$ 6.00	$ 17.46	$ 33.08	$ 38.02
C		$ (11.11)	$ (10.29)	$ (8.73)	$ 33.08	$ 2.95

	No PLA Probabilty	Probabilty X NPV	With PLA Probability	Probabilty X NPV
No Labor Disruption	75%	$ 54.87	95%	$ 69.50
Minor Disruption	15%	$ 5.70	4%	$ 1.52
Major Disruption	10%	$ 0.29	1%	$ 0.03
Expected Value of NPVs	100%	$ 60.86	100%	$ 71.05

Full Project Completed	Year 1	Year 2	Year 3	Year 4	
Project Revenue	0	45	45	45	PV of Revenue

		Present Value of Scenario				
		$ 0.00	$ 38.58	$ 35.72	$ 33.08	$ 107.38

Contractor Perspective		2014	2015	2016	2017
With Penalty Clause		Future Cash Flows			
Paid for Work but Pays Penalty		Year 1	Year 2	Year 3	Year 4
No Labor Disruption	A	$ -	$ -	$ -	$ -
Minor Disruption	B	$ -	$ (26.00)	$ (15.00)	$ -
Major Disruption	C	$ -	$ (41.00)	$ (40.00)	$ -

		Present Value of Scenario				
		Year 1	Year 2	Year 3	Year 4	Total NPV
A		$ -	$ -	$ -	$ -	$ -
B		$ -	$ (22.29)	$ (11.91)	$ -	$ (34.20)
C		$ -	$ (35.15)	$ (31.75)	$ -	$ (66.90)

	No PLA Probabilty	Probabilty X NPV	With PLA Probability	Probabilty X NPV
No Labor Disruption	75%	$ -	95%	$ -
Minor Disruption	15%	$ (5.13)	4%	$ (1.37)
Major Disruption	10%	$ (6.69)	1%	$ (0.67)
Expected Value of NPVs	100%	$ (11.82)	100%	$ (2.04)

	Baseline	PLA	% Increase	% of Costs	% of Costs with PLA
Capital Costs	12	12	100%	60%	50%
Labor Costs	5	9	180%	25%	38%
Financing Costs	3	3	100%	15%	13%
Delay Payments					
	20	24			

	Wage Differential
Non - Union	$ 225.00
Union	$ 325.00
Difference	44%

Project Costs - Manhattan from RPA

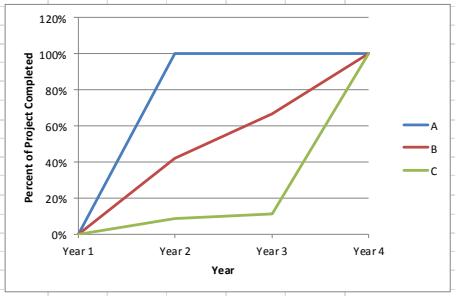
	Costs	% pf Costs	Our Project
Land	$ 50.00	31.61%	12.01011
Hard Costs	$ 71.50	45.20%	17.17446
Soft Costs	$ 17.88	11.30%	4.293616
Financing	$ 18.83	11.90%	4.521808
Total Proj	$ 158.20		38
Labor - Non Union			8.587231
Labor Union			12.36561
			144%

Implied Penalty Costs - What would have to be Paid to Replace Project Revenue	Year 1	Year 2	Year 3	Year 4	Total
A	0	0	0	0	0
B	0	26	15	0	41
C	0	41	40	0	81

Construction Costs	Year 1	Year 2	Year 3	Year 4	Total
A	-24	-14	0	0	-38
B	-20	-12	-8	0	-40
C	-12	-16	-16	0	-44

Revenue To Owner from Use of Project					Total
A	0	45	45	45	135
B	0	19	30	45	94
C	0	4	5	45	54

Percent Completion Year	Year 1	Year 2	Year 3	Year 4
A	0%	100%	100%	100%
B	0%	42%	67%	100%
C	0%	9%	11%	100%



Potential Outcomes

- 3 Possible Outcomes Evaluated
- Outcome A – No Labor Disruption
- Outcome B – Minor Labor Disruption
- Outcome C – Major Labor Disruption

- More outcomes could be modeled
- Relative chance of each outcome could vary by project and over time.

Key Project Assumptions

- Financing Aspects – borrowing costs
- Project Construction Aspects – Cost and time of construction, project delivery
- Owner Income Aspects – Revenue from Project
- Risk Aspects – chances of various outcomes
- Penalty Aspects – if project has penalty clause for late delivery – who pays?

Key Project Specific Assumptions

Rate of Return Assumptions

PLA Value Estimation - Project Example

Jonathan Peters - College of Staten Island - CUNY

10-Oct-13

Assumptions

4 Year Project

Labor Unrest can be Eliminated by PLA

Labor Costs are 25% of Total Project Costs

18 Months Construction under No Labor Disruption

Cost for Late Delivery - there is a Penalty Clause in contract to provide alt facility

Interest rate = 8%

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Without Penalty Clause
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Contractor Perspective
With Penalty Clause
Paid for Work but Pays Penalty

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		Present Value of Scenario				
		Year 1	Year 2	Year 3	Year 4	Total NPV
No Labor Disruption	A	$ (22.22)	$ 26.58	$ 35.72	$ 33.08	$ 73.15
Minor Disruption	B	$ (18.52)	$ 6.00	$ 17.46	$ 33.08	$ 38.02
Major Disruption	C	$ (11.11)	$ (10.29)	$ (8.73)	$ 33.08	$ 2.95

	No PLA Probabilty	Probabilty X NPV	With PLA Probability	Probabilty X NPV
No Labor Disruption	75%	$ 54.87	95%	$ 69.50
Minor Disruption	15%	$ 5.70	4%	$ 1.52
Major Disruption	10%	$ 0.29	1%	$ 0.03
Expected Value of NPVs	100%	$ 60.86	100%	$ 71.05

Full Project Completed	Year 1	Year 2	Year 3	Year 4
Project Revenue	0	45	45	45

PV of Revenue				
$ -	$ 38.58	$ 35.72	$ 33.08	$ 107.38

Contractor Perspective — With Penalty Clause — Paid for Work but Pays Penalty

		2014	2015	2016	2017
		Future Cash Flows			
		Year 1	Year 2	Year 3	Year 4
No Labor Disruption	A	$ -	$ -	$ -	$ -
Minor Disruption	B	$ -	$ (26.00)	$ (15.00)	$ -
Major Disruption	C	$ -	$ (41.00)	$ (40.00)	$ -

		Present Value of Scenario				
		Year 1	Year 2	Year 3	Year 4	Total NPV
No Labor Disruption	A	$ -	$ -	$ -	$ -	$ -
Minor Disruption	B	$ -	$ (22.29)	$ (11.91)	$ -	$ (34.20)
Major Disruption	C	$ -	$ (35.15)	$ (31.75)	$ -	$ (66.90)

	No PLA Probabilty	Probabilty X NPV	With PLA Probability	Probabilty X NPV
No Labor Disruption	75%	$ -	95%	$ -
Minor Disruption	15%	$ (5.13)	4%	$ (1.37)
Major Disruption	10%	$ (6.69)	1%	$ (0.67)
Expected Value of NPVs	100%	$ (11.82)	100%	$ (2.04)

	Baseline	PLA	% Increase	% of Costs	% of Costs with PLA
Capital Costs	12	12	100%	60%	50%
Labor Costs	5	9	180%	25%	38%
Financing Costs	3	3	100%	15%	13%
Delay Payments					
	20	24			

Wage Differential	
Non - Union	$ 225.00
Union	$ 325.00
Difference	44%

Project Costs - Manhattan from RPA

	Costs	% pf Costs	Our Project
Land	$ 50.00	31.61%	12.01011
Hard Costs	$ 71.50	45.20%	17.17446
Soft Costs	$ 17.88	11.30%	4.293616
Financing	$ 18.83	11.90%	4.521808
Total Proj	$ 158.20		38
Labor - Non Union			8.587231
Labor Union			12.36561
			144%

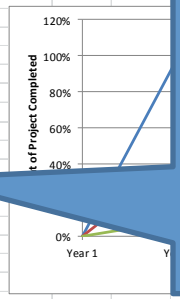
Implied Penalty Costs - What would have to be Paid to Replace Project Revenue

	Year 1	Year 2	Year 3	Year 4	Total
A	0	0	0	0	0
B	0	26	15	0	41
C	0	41	40	0	81

Construction Costs	Year 1	Year 2	Year 3	Year 4	Total
A	-24	-14	0	0	-38
B	-20	-12	-8	0	-40
C	-12	-16	-16	0	

Revenue To Owner from Use of Project					Total
A	0	45	45	45	135
B	0	19	30	45	94
C	0	4	5	45	54

Percent Completion Year	Year 1	Year 2	Year 3	Year 4
A	0%	100%	100%	100%
B	0%	42%	67%	100%
C	0%	9%	11%	100%



Key Construction and Revenue Assumptions

Construction Costs	Year 1	Year 2	Year 3	Year 4
A	-24	-14	0	0
B	-20	-12	-8	0
C	-12	-16	-16	0

Revenue To Owner from Use of Project				
A	0	45	45	45
B	0	19	30	45
C	0	4	5	45

Percent Completion Year	Year 1	Year 2	Year 3	Year 4
A	0%	100%	100%	100%
B	0%	42%	67%	100%
C	0%	9%	11%	100%

Assumptions on project costs and revenue paid based on level of project completion.
With strike or labor disruption – project is delayed and revenue is delayed.
Construction costs are delayed and increased in total for a project with a labor action.

These items feed into the net cash flows

Project Specific Assumptions

PLA Value Estimation - Project Example

Assumptions	
4 Year Project	Interest rate = 8%
Labor Unrest can be Eliminated by PLA	Project can be partially
Union Labor adds 44% to Labor Costs	delivered to owner for use
Labor Costs are 25% of Total Project Costs	
18 Months Construction under No Labor Disruption	

Project specific items are based upon the given aspects of a given construction job.
Some projects can only be delivered fully completed – say an underwater tunnel
Some projects can be partially completed and delivered in sections – say a hotel
Labor cost as a percentage of costs can vary by project.

Rate of Return Assumptions

Rate of Return Assumptions				
	1	2	3	4
	Year 1	Year 2	Year 3	Year 4
Interest Rate	0.08	0.08	0.08	0.08
1+i	1.08	1.08	1.08	1.08
FVIF	1.08	1.1664	1.259712	1.360489

Specific based on time horizon, risk and financing of project

Lower rates for municipal projects – triple tax free rate

Higher for risky private projects

PLA Value Estimation - Project Example

Jonathan Peters - College of Staten Island - CUNY

10-Oct-13

Assumptions		
4 Year Project	Interest rate = 8%	
Labor Unrest can be Eliminated by PLA	Project can be partially	
	delivered to owner for use	
Labor Costs are 25% of Total Project Costs		
18 Months Construction under No Labor Disruption		
Cost for Late Delivery - there is a Penalty Clause in contract to provide alt facility		

Rate of Return Assumptions	1	2	3	4
	Year 1	Year 2	Year 3	Year 4
Interest Rate	0.08	0.08	0.08	0.08
1+i	1.08	1.08	1.08	1.08
FVIF	1.08	1.1664	1.259712	1.360489

Owner of Project Perspective

Owner Perspective		2014	2015	2016	2017
Without Penalty Clause		Future Cash Flows			
Pays Construction Cost and Collects Revenue from Project		Year 1	Year 2	Year 3	Year 4
No Labor Disruption	A	$ (24.00)	$ 31.00	$ 45.00	$ 45.00
Minor Disruption	B	$ (2[illegible].00)	$ 7.[illegible]0	$ 22.[illegible]0	4[illegible].00
Major Disruption	C	$ (12.00)	$ (12.00)	$ (11.00)	$ 45.00

Present Value of Scenario	Year 1	Year 2	Year 3	Year 4	Total NPV
A	$ (22.22)	$ 26.58	$ 35.72	$ 33.08	$ 73.15
B	$ (1[illegible])	$ [illegible].00	$ 17.46	$ [illegible].08	$ 38.02
C	$ (11.11)	$ (10.29)	$ (8.73)	$ 33.08	$ 2.95

	No PLA Probabilty	Probabilty X NPV	With PLA Probability	Probabilty X NPV
No Labor Disruption	75%	$ 54.87	95%	$ 69.50
Minor Disruption	15%	$ [illegible].70	[illegible]%	$ 1.52
Major Disruption	10%	$ 0.29	1%	$ 0.03
Expected Value of NPVs	100%	$ 60.86	100%	$ 71.05

Full Project Completed	Year 1	Year 2	Year 3	Year 4
Project Revenue	0	45	45	45

PV of Revenue					
	$ -	$ 38.58	$ 35.72	$ 33.08	$ 107.38

Contractor Perspective

Contractor Perspective		2014	2015	2016	2017
With Penalty Clause		Future Cash Flows			
Paid for Work but Pays Penalty		Year 1	Year 2	Year 3	Year 4
No Labor Disruption	A	$ -	$ [illegible]	$ [illegible]	$ -
Minor Disruption	B	$ [illegible]	$ (26.[illegible])	$ (15.[illegible])	$ -
Major Disruption	C	$ -	$ (41.00)	$ (40.00)	$ -

Present Value of Scenario	Year 1	Year 2	Year 3	Year 4	Total NPV
A	$ -	$ [illegible]	$ -	$ -	$ -
B	$ [illegible]	$ (22.29)	$ (11.[illegible])	$ -	$ (34.[illegible])
C	$ -	$ (35.15)	$ (31.75)	$ -	$ (66.90)

	No PLA Probabilty	Probabilty X NPV	With PLA Probability	Probabilty X NPV
No Labor Disruption	[illegible]%	$ -	95%	$ -
Minor Disruption	[illegible]%	$ (5.13)	4%	$ (1.37)
Major Disruption	10%	$ (6.69)	1%	$ (0.67)
Expected Value of NPVs	100%	$ (11.82)	100%	$ (2.04)

PLA Value Estimation - Project Example

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Assumptions

4 Year Project

Labor Unrest can be Eliminated by PLA

Interest rate = 8%

Project can be partially delivered to owner for use

Labor Costs are 25% of Total Project Costs

18 Months Construction under No Labor Disruption

Cost for Late Delivery - there is a Penalty Clause in contract to provide alt facility

Rate of Return Assumptions

	1	2	3	4
	Year 1	Year 2	Year 3	Year 4
Interest Rate	0.08	0.08	0.08	0.08
1+i	1.08	1.08	1.08	1.08
FVIF	1.08	1.1664	1.259712	1.360489

Cash Flows

Present Values

Expected Values

Owner Perspective 2014 2015 2016 2017

Without Penalty Clause Future Cash Flows

Pays Construction Cost and Collects Revenue from Project

		Year 1	Year 2	Year 3	Year 4
No Labor Disruption	A	$ (20.00)	$ 31.00	$ 45.00	$ 45.00
Minor Disruption	B	$ (20.00)	$ 7.00	$ 22.00	$ 45.00
Major Disruption	C	$ (12.00)	$ (12.00)	$ (11.00)	$ 45.00

Present Value of Scenario

	Year 1	Year 2	Year 3	Year 4	Total NPV
A	$ (22.22)	$ 26.58	$ 35.72	$ 33.08	$ 73.15
B	$ (18.52)	$ 6.08	$ 17.46	$ 33.08	$ 38.02
C	$ (11.11)	$ (10.29)	$ (8.73)	$ 33.08	$ 2.95

	No PLA Probabilty	Probabilty X NPV	With PLA Probability	Probabilty X NPV
No Labor Disruption	75%	$ 54.87	95%	$ 69.50
Minor Disruption	15%	$ 5.70	4%	$ 1.52
Major Disruption	10%	$ 0.29	1%	$ 0.03
Expected Value of NPVs	100%	$ 60.86	100%	$ 71.05

Full Project Completed	Year 1	Year 2	Year 3	Year 4
Project Revenue	0	45	45	45

PV of Revenue $ - $ 38.58 $ 35.72 $ 33.08 $ 107.38

Contractor Perspective 2014 2015 2016 2017

With Penalty Clause Future Cash Flows

Paid for Work but Pays Penalty

		Year 1	Year 2	Year 3	Year 4
No Labor Disruption	A	$ -	$ -	$ -	$ -
Minor Disruption	B	$ -	$ (26.00)	$ (15.00)	$ -
Major Disruption	C	$ -	$ (41.00)	$ (40.00)	$ -

Present Value of Scenario

	Year 1	Year 2	Year 3	Year 4	Total NPV
	$ -	$ -	$ -	$ -	$ -
	$ -	$ (22.29)	$ (11.91)	$ -	$ (34.20)
	$ -	$ (35.15)	$ (31.75)	$ -	$ (66.90)

	No PLA Probabilty	Probabilty X NPV	With PLA Probability	Probabilty X NPV
No Labor Disruption	75%	$ -	95%	$ -
Minor Disruption	15%	$ (5.13)	4%	$ (1.37)
Major Disruption	10%	$ (6.69)	1%	$ (0.67)
Expected Value of NPVs	100%	$ (11.82)	100%	$ (2.04)

Owner Perspective		2014	2015	2016	2017
Without Penalty Clause		Future Cash Flows			
Pays Construction Cost and Collects Revenue from Project		Year 1	Year 2	Year 3	Year 4
No Labor Disruption	A	$ (24.00)	$ 31.00	$ 45.00	$ 45.00
Minor Disruption	B	$ (20.00)	$ 7.00	$ 22.00	$ 45.00
Major Disruption	C	$ (12.00)	$ (12.00)	$ (11.00)	$ 45.00

Total Cash Flows from project are related to construction costs (negative) and revenue (positive) derived from the project.

	Present Value of Scenario				
	Year 1	Year 2	Year 3	Year 4	Total NPV
A	$ (22.22)	$ 26.58	$ 35.72	$ 33.08	$ 73.15
B	$ (18.52)	$ 6.00	$ 17.46	$ 33.08	$ 38.02
C	$ (11.11)	$ (10.29)	$ (8.73)	$ 33.08	$ 2.95

We take the present value of each of the cash flows (revenue – costs) for each of the various years of the Project – this gives us the value of all cash flows from the owner perspective in terms of the today's value.

	No PLA Probabilty	Probabilty X NPV	With PLA Probability	Probabilty X NPV
No Labor Disruption	75%	$ 54.87	95%	$ 69.50
Minor Disruption	15%	$ 5.70	4%	$ 1.52
Major Disruption	10%	$ 0.29	1%	$ 0.03
Expected Value of NPVs	100%	$ 60.86	100%	$ 71.05

Then we weight the present value of each outcome by the chance of occurrence. We sum the value of all the outcomes. This gives us the expected value of the project.

Here – we have two alternative outcomes – one with a PLA and the other without a PLA. Having a PLA reduces the risk of minor and major Labor disruption. This results in the expected value to the Owner changes as we change the risk of labor disruption.

	No PLA Probabilty	Probabilty X NPV	With PLA Probability	Probabilty X NPV
No Labor Disruption	75%	$ 54.87	95%	$ 69.50
Minor Disruption	15%	$ 5.70	4%	$ 1.52
Major Disruption	10%	$ 0.29	1%	$ 0.03
Expected Value of NPVs	100%	$ 60.86	100%	$ 71.05

Expected Value Of Project Without A PLA

Expected Value of Project With A PLA

PLA Value

- Signing a PLA alters the probability (risk) of labor unrest. This change alters the expected value of a project.
- The difference in value between the expected value under the PLA and the expected value without the PLA represents the PLA value.
- This value varies based upon the project conditions.
- The value is shared between labor and owners depending upon negotiation skills, market power, project value and other factors.

Factors Impacting Value Share

- Owners may choose to bargain hard for a lower cost of labor or better conditions – most likely if the margins/profit is slim.
- If a project has strong revenue prospects – the owner may want to get a PLA and will quickly settle to get a decent labor contract that gets the project completed as fast as possible
- Low labor percentage projects will give owners stronger incentive to get a reasonable labor deal to keep the large capital stock working.

Owner Conditions & Needs

- PLA's can be very useful to the owner for a project with complex financing.
- Complex and uncertain financing conditions make project completion more valuable.
- The inability to refinance or extend the project financing package will make an owner value project completion and project certainty more highly.
- The Credit Crisis in 2008 would be a great example of periods when refinancing or extending loans was difficult.
- If an owner defaults on another project – and goes into financial distress - this would impact the value of project completion – as future financing might be unavailable to this particular owner.

Building Project

College of Staten Island Student Housing

CSI Student Housing Project
Project Information

- Developer: American Campus Communities
- Manager: American Campus Communities
- Owner: City University of New York
- Architect: WDG Architecture
- Contractor: T.G. Nickel & Associates
- Subject to labor unrest during project

CSI Student Housing Project

- 40 Million Dollar Project
- 133 Units
- 173,000 Square Feet
- Site Improvements
- Revenue of $20.3 Million Per Year

College of Staten Island Student Housing

College of Staten Island Student Housing

Highway and Bridge Project

Highway: Thruway Construction and Improvement Exits 23-24

Thruway Reconstruction and Mobility Improvement Project

New York State Thruway: I – 87 between Exit 23 and Exit 24.

Project Background

- Located between Interchanges 23 and 24 of NYS Thruway.
- Full depth pavement reconstruction of 6.74 miles of the NYST, addition of a third lane in both directions and the construction of noise barriers
- Contractor: Rifenburg Construction, Inc.
- Funding: 100% Thruway funds.

Project Justification

- Alleviate traffic congestion; increase mobility
- Improve pavement conditions
- Potentially improve emergency response times.
- Address seasonal vacation travel

Operational Characteristics

- AADT (2009) – 45,410
- Annual Truck Percentage (2009) est. – 25.1%;
  - AADT for trucks (2009) – 11,397.
- This section of the Thruway is roughly 3 miles away from the Port of Albany.
- Peak hour operating speeds - > 59mph

Project Costs and Schedule

- Costs;
  - Highway Reconstruction: $ 52,110,000.00
  - Noise Mitigation: $ 7,550,000.00
  - Maintenance & Protection of Traffic: $ 11,740,000.00

Sub-Total: $ 71,400,000.00

- Construction Inspection $ 4,280,000.00

TOTAL: $ 75,680,000.00*

* Cost data from the Final EIS Report published in 2006.

Project Costs and Schedule

- Low Bid Amount: $ 99,671,115
- Difference between FEIS Estimated Project Cost in 2006 and Accepted Low Bid Amount by Rifenburg Construction Inc. in 2010 is:

$ 99,671,115 - $ 75,680,000.00 =

23,991,115

OR

31.7%

Project Costs and Schedule

- Project Schedule;
  - Findings Statement(Final EIS) - 09/2006
  - Plans Completion - 2008
  - Contract Letting Date – 11/17/2010
  - Construction Start - 03/2011
  - Expected Completion of Construction - Fall of 2013

Economic data within the CDTC Area

- Median house-hold income, 2006 – 2010
  - Albany – 56,090
  - Rensselaer – 54,152
  - Schenectady – 55,188
  - Saratoga – 65,100

Model Example – Highway Project

Highway Project Assumptions

Municipal Highway/Bridge Assumptions				
10 Year Project in Terms of Value		Interest rate = 4%		
Labor Unrest can be Eliminated by PLA		Project can be partially		
99.671 Million Dollar Project Costs		delivered to owner for use		
Social Costs of 76.929 Million per year at 10 Minute Delay for users				
30 Months Construction under No Labor Disruption				
Delay benefits continue out for years 4-10				

PLA Value Estimation - Project Example

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4-Nov-13

Municipal Highway/Bridge Assumptions	
10 Year Project in Terms of Value	Interest rate = 4%
Labor Unrest can be Eliminated by PLA	Project can be partially
99.671 Million Dollar Project Costs	delivered to owner for use
Social Costs of 76.929 Million per year at 10 Minute Delay for users	
30 Months Construction under No Labor Disruption	
Delay benefits continue out for years 4-10	

Rate of Return Assumptions	1	2	3	6.5
	Year 1	Year 2	Year 3	Year 4-10
Interest Rate	0.04	0.04	0.04	0.04
1+i	1.04	1.04	1.04	1.04
FVIF	1.04	1.0816	1.124864	1.290377273

Owner Perspective		2011	2012	2013	2014-2020
Without Penalty Clause		Future Cash Flows			
Pays Construction Cost and Consider Social Costs		Year 1	Year 2	Year 3	Year 4-10
No Labor Disruption	A	$ (101.85)	$ (88.30)	$ (24.92)	$ 538.50
Minor Disruption	B	$ (87.39)	$ (92.94)	$ (98.48)	$ 528.04
Major Disruption	C	$ (82.91)	$ (79.06)	$ (109.39)	$ 478.70

Total Value of Project is Construction costs (-) plus Social Costs (+ or -)

Higher numbers are better in terms of total outcome

Full Project Completed	Year 1	Year 2	Year 3	Year 4-10
Project Social Costs	See Table Below			

Present Value of Scenario		Year 1	Year 2	Year 3	Year 4-10	Total NPV
	A	$ (97.93)	$ (81.64)	$ (22.15)	$ 417.32	$ 215.60
	B	$ (84.03)	$ (85.93)	$ (87.55)	$ 409.21	$ 151.70
	C	$ (79.72)	$ (73.10)	$ (97.24)	$ 370.98	$ 120.92

PV of Revenue

	No PLA Probabilty	Probabilty X NPV	With PLA Probability	Probabilty X NPV
No Labor Disruption	75%	$ 161.70	95%	$ 204.82
Minor Disruption	15%	$ 22.75	4%	$ 6.07
Major Disruption	10%	$ 12.09	1%	$ 1.21
Expected Value of NPVs	100%	$ 196.55	100%	$ 212.10

No PLA outcomes is worse than PLA Outcome in terms of total package of costs as you give up years of social benefit in project.

Contractor Perspective		2011	2012	2013	2014-2020
With Penalty Clause		Future Cash Flows			
Paid for Work but Pays Penalty		Year 1	Year 2	Year 3	Year 4
Costs Avoided in this case - Higher numbers are better (low negative numbers)					
No Labor Disruption	A	$ -	$ -	$ -	$ -
Minor Disruption	B	$ -	$ (23.08)	$ (46.16)	$ -
Major Disruption	C	$ -	$ (34.62)	$ (61.54)	$ -

Contractor has to pay for Social Costs of Delay as a penalty if the project is delayed Compared to the Base Case of Scenario A - which is the expected social costs.

Present Value of Scenario		Year 1	Year 2	Year 3	Year 4	Total NPV
	A	$ -	$ -	$ -	$ -	$ -
	B	$ -	$ (21.34)	$ (41.03)	$ -	$ (62.37)
	C	$ -	$ (32.01)	$ (54.71)	$ -	$ (86.72)

	No PLA Probabilty	Probabilty X NPV	With PLA Probability	Probabilty X NPV
No Labor Disruption	75%	$ -	95%	$ -
Minor Disruption	15%	$ (9.36)	4%	$ (2.49)
Major Disruption	10%	$ (8.67)	1%	$ (0.87)
Expected Value of NPVs	100%	$ (18.03)	100%	$ (3.36)

Contractor has less penalty costs under PLA as they have less delay in project

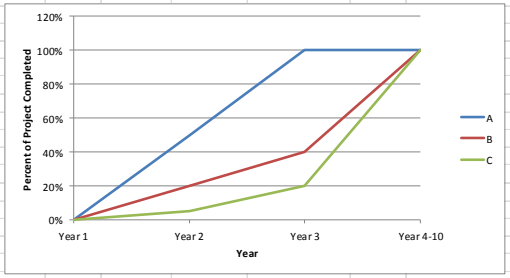
Implied Penalty Costs - What would have to be Paid to cover Extra Social Costs from Base Case		Year 1	Year 2	Year 3	Year 4-10	Total
	A	$ -	$ -	$ -	$ -	$ -
	B	$ -	$ 23.08	$ 46.16	$ -	$ 69.24
	C	$ -	$ 34.62	$ 61.54	$ -	$ 96.16

Construction Costs		Year 1	Year 2	Year 3	Year 4-10	Total
	A	$ 24.92	$ 49.84	$ 24.92	$ -	99.671
	B	$ 10.47	$ 31.40	$ 52.33	$ 10.47	104.65455
	C	$ 5.98	$ 5.98	$ 47.84	$ 59.80	119.6052

Social Costs Avoided by Completion of Project					Benefits	Total Benefits
76.929	A	76.929	38.4645	0	-538.503	-423.1095
76.929	B	76.929	61.5432	46.1574	-538.503	-353.8734
76.929	C	76.929	73.08255	61.5432	-538.503	-326.94825

Percent Completion	Year	Year 1	Year 2	Year 3	Year 4-10
	A	0%	50%	100%	100%
	B	0%	20%	40%	100%
	C	0%	5%	20%	100%

Percent of Costs by Year						
99.671	A	25%	50%	25%	0%	100%
104.6546	B	10%	30%	50%	10%	100%
119.6052	C	5%	5%	40%	50%	100%



Rate of Return Assumptions				
	1	2	3	6.5
	Year 1	Year 2	Year 3	Year 4-10
Interest Rate	0.04	0.04	0.04	0.04
1+i	1.04	1.04	1.04	1.04
FVIF	1.04	1.0816	1.124864	1.290377273

Implied Penalty Costs - What would have to be Paid to cover Extra Social Costs from Base Case						
		Year 1	Year 2	Year 3	Year 4-10	Total
	A	$ -	$ -	$ -	$ -	$ -
	B	$ -	$ 23.08	$ 46.16	$ -	$ 69.24
	C	$ -	$ 34.62	$ 61.54	$ -	$ 96.16

Construction Costs		Year 1	Year 2	Year 3	Year 4-10	Total
	A	$ 24.92	$ 49.84	$ 24.92	$ -	99.671
	B	$ 10.47	$ 31.40	$ 52.33	$ 10.47	104.65455
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Social Costs Avoided by Completion of Project					Benefits	Total Benefits
76.929	A	76.929	38.4645	0	-538.503	-423.1095
76.929	B	76.929	61.5432	46.1574	-538.503	-353.8734
76.929	C	76.929	73.08255	61.5432	-538.503	-326.94825

Percent Completion	Year	Year 1	Year 2	Year 3	Year 4-10	
	A	0%	50%	100%	100%	
	B	0%	20%	40%	100%	
	C	0%	5%	20%	100%	

Percent of Costs by Year						
99.671	A	25%	50%	25%	0%	100%
104.6546	B	10%	30%	50%	10%	100%
119.6052	C	5%	5%	40%	50%	100%

Owner Perspective		2011	2012	2013	2014-2020
Without Penalty Clause		Future Cash Flows			
Pays Construction Cost and Consider Social Costs		Year 1	Year 2	Year 3	Year 4-10
No Labor Disruption	A	$ (101.85)	$ (88.30)	$ (24.92)	$ 538.50
Minor Disruption	B	$ (87.39)	$ (92.94)	$ (98.48)	$ 528.04
Major Disruption	C	$ (82.91)	$ (79.06)	$ (109.39)	$ 478.70

Total Value of Project is Construction costs (-) plus Social Costs (+ or -)
Higher numbers are better in terms of total outcome

	Present Value of Scenario				
	Year 1	Year 2	Year 3	Year 4-10	Total NPV
A	$ (97.93)	$ (81.64)	$ (22.15)	$ 417.32	$ 215.60
B	$ (84.03)	$ (85.93)	$ (87.55)	$ 409.21	$ 151.70
C	$ (79.72)	$ (73.10)	$ (97.24)	$ 370.98	$ 120.92

	No PLA Probabilty	Probabilty X NPV	With PLA Probability	Probabilty X NPV
No Labor Disruption	75%	$ 161.70	95%	$ 204.82
Minor Disruption	15%	$ 22.75	4%	$ 6.07
Major Disruption	10%	$ 12.09	1%	$ 1.21
Expected Value of NPVs	100%	$ 196.55	100%	$ 212.10

No PLA outcomes is worse than PLA Outcome in terms of total package of costs as you give up years of social benefit in project.

Social Costs

- Annualized based on 250 days of commuter travel
- Additional delay during non-commuter days would add costs
- Valued at 10 minute delay per user on facility
- Cost per user is based on 45,290 users per day based on NYS DOT AADT for the facility.
- Wage rate based on U.S. Census Data (2010)

Social Costs II

- Valued on the low end of spectrum
- Assume that social costs are put into the contract as a penalty clause for delays beyond the base case scenario.
- Model values social benefits of road improvements for years 4-10 to capture long term benefit of project.