Case Exercise: Sketch of Solution

In the following, in order to put all of the costs and benefits together on a common basis, I will calculate their present value using a real interest rate of 3%.

Benefits to Theater Audiences and Event Sponsors:

It seems clear that citizens of Sylvania have been culturally deprived, since there have been very few events of the sort that the Bijou will make possible. Even the Film Co-op managed only one movie a week. Therefore it is reasonable to assume that most of the audience for new events in the Bijou will not simply be substituting away from some other very comparable source of entertainment, and that their willingness to pay need not be bounded by the prices of such events else where.

The Just Ask Us (JAU) consultants estimate a demand for tickets of 1200 per performance at a price of $1 and 500 per performance at a price of $5. Assuming that demand is linear, the inverse demand curve is

$P=a-bQ$

$5=a-b500$

$1=a-b1200$

$4=b700$

$b=4/700=.00571$

$a=5+b500=5+(4/700)500=5+4*5/7=(35+20)/7=55/7=7.857$

$P=55/7-(4/700)Q$

where Q is tickets per performance.

We must make some assumption about what price to charge for the tickets. Since the cost of a performance does not depend on the number of tickets sold, and since even at a price of $1 not quite all of the 1200 seats would normally be filled according to JAU, a price of $1 seems about optimal from a social standpoint. (A higher price would collect more revenue but reduce consumer surplus without reducing real cost. A lower price would not increase the number who could see the performance, and would instead just cause the inefficiencies of excess demand.)

At a price of $1, expected revenue for the theater is $1200 per performance (which also, conveniently, more than covers the expected $1000 cost, allowing the sponsors of the event a net profit of $200 per performance). The total consumer surplus per performance is calculated from the above demand curve:

$CS=\frac{1}{2}(55/7-1)(1200)=4114.286$

These numbers are all per performance. Using JAU's projection of ten events per week, 52 weeks per year, these benefits and costs should all be multiplied by 520 to put them in annual terms. Thus we have the following annual benefits, measured in today's prices, but beginning only in year 3 (according to Mr. Beancounter) counting the current year as year 1:

Gain in consumer surplus of theater goers:

GOERS(t)= ½ (55/7 – 1) (1200)(520)=$2,139,428 t=3,4,…

In present value terms, this is a constant flow of benefits in the future, but missing the benefit in the first two years.

PV(GOERS)=GOERS/r – GOERS/(1+r)= $2,139,428[1/0.03 – 1/1.03]
=$2,139,428[32.36246]=$69,237,152

Profit for sponsors of events:

SPONS(t)=200(520)=$104,000 t=3,4,…

PV(SPONS)=SPONS[1/r – 1/(1+r)]=$104,000[32.36246]=$3,365,696

Costs of construction:

Bijou $2,200,000
Parking Structure $1,500,000
Assume:
These costs are spread evenly over the two-year period of construction
Construction services are purchased at market prices from suppliers outside Sylvania.

CONST(t)=(2,200,000+1,500,000)/2=$1,850,000 t=1,2

PV(CONST)= $1,850,000+$1,850,000/(1.03)=$3,646,120

Operating costs of theater and parking structure:

As detailed in the proposal, costs per year at current prices:

Utilities		
Heat, etc.	$240,000	
Water*	14,500	
Theater Maintenance	60,000	
Administrator	42,000	
+Fringes @15%	6,300	
Structure Maintenance	120,000	
Total=OPER(t)=	$482,800	t=3,4,…

PV(OPER)=$482,800(32.36246)=$15,624,596

Costs of Properties:

The city must acquire the theater from its current owner. We don't know much about the owner, nor about how much will have to be paid. I will assume that the owner is a resident of the city, so that payments to him or her are just transfers within the city, rather than a net cost. Assuming that the theater is worth at least as much as any other commercial property on Main Street, I will set its price at the same $160,000 that Bonita Springs says other properties are currently worth. It will, of course, be worth more once the project is completed, for the same reasons as the other properties, but it does not appear that the current owner could ever take advantage of that. One could also, presumably, argue that the city needs to pay next to nothing for the theater, since the owner is having such difficulty finding a buyer and since the city can, as it did on the proposed sale to House of Pleasure, veto any other use. But that might not be legally viable, and it would also seem to be unfair.

The city already owns the lot on which it will build the parking structure, so it does not have to buy it. Nonetheless, there is still some opportunity cost associated with using it for a parking structure instead of for something else. Since the leading alternative being discussed was a park, we could argue that the park is the opportunity cost of the structure. However, that does not help much in our efforts to quantify costs. I will therefore leave this for a list of miscellaneous costs and benefits that will be listed below.

Effects on Main Street Merchants:

There are three clues to the effects on the merchants in the testimony. John Herbivore thinks that his sales, which have fallen in half, will return to what they were before. Even if he is correct, that isn't very helpful by itself, since we don't know what his sales are.

Nellie Clingcoffee gives a much more precise estimate of the effect of attendance at the Bijou on the revenues and therefore profits of the neighborhood merchants as a group. She estimates that half of them would spend $10 each on food and drink, while a quarter of them spend another $25 on other things, and she says that half of all that is profit. Thus for every, say 100 tickets sold at the Bijou there is expenditure at local shops of $10x50=$500 on food and drink, plus $25x25=$625 on other things, for a total revenue of $1125 and profit of $562.50. Using JAU's projection of theater attendance at again a ticket price of $1, we get 1200 people attending each performance, 10 performances a week and 52 weeks a year, for a total of (1200)(10)(52)=624,000 people. Thus Nellie's estimate of what they will spend a year is 6240*$1125=$7,020,000. With half of that value added (profits, rents, and wages), Main Street merchants and their employees gain $3,510,000 a year, starting in year 3:

$$MERCH(t)=\$3,510,000 \qquad t=3,4,\ldots$$

$$PV(MERCH)=MERCH[1/r - 1/(1+r)]= \$3,510,000[32.36246]=\$113,592,230$$

Bonita Springs provides another estimate of the effect on the same group. She says that average property values in Sylvania have risen at a rate of 3% a year for the three years

since the opening of the mall, while Main Street commercial properties have fallen at 20% a year over the same period, and that the project will bring the commercial properties back up to where they would have been had they risen at 3% along with everybody else. Their average value right now is $160,000, after falling 20% a year for three years. Thus, three years ago they must have been worth X, where, X(1-.2)=$160,000, or X=$200,000. Had they appreciated instead at the rate 3%, they would now be worth (1.03)(1.03)(1.03)$200,000=$218545. Thus, if Bonita is right, each commercial property owner stands to gain $218,545–160,000=$58,545 at today's prices if the project is done. The gain in property value for all 21 properties together is 21*$58,545=$1,229,445.

The estimated gain in property value is clearly much less than the present value of the increase in projected profits of the merchants calculated above. At the same time, it seems likely that any increase in property values is in large part due to the increase in profits, so that to count both as separate benefits would be double counting. Of course it is possible that one of these estimates is simply wrong, but I will assume that at least the Clingcoffee numbers are right. It may be that a large part of the increased value added does not get built into the property values, but goes instead into the values of the businesses that are located on those properties, their workers, etc. Or it may be that Bonita Springs' prediction that the businesses will merely recover their lost property values is itself too low, since it does not include the values added to the merchants as more people are attracted to the new Bijou than the old, both because the restoration makes it more appealing and because of the availability of parking. On the other hand, even Clingcoffee's estimate may be low, since it does not account for the gains to Main Street merchants from improved parking independently of the theater. In any case, I will use the value added estimate as the more reliable measure of the effects on the merchants.

Merchants themselves do not get to keep all of the increase in value added. I'll assume that two thirds of it goes to their workers and the remaining is income for the merchants and their landlords, whom I will assume are one and the same. Thus one third of the increased present value for the merchants calculated above shows up as increased property values on Main Street:

Increase in Main Street Property Values= PV(MERCH)/3=$409,815

According to Mr. Beancounter, the city takes 3 percent of half of this, or

Increased property taxes on Main Street=0.03*.5*409,815=$6147

Effects on Elm Street Homeowners:

According to Omigosh Whatnow, each of eight homeowners will suffer a fall in their property values of $14,000, for a total loss of $112,000. Whoever owns the house where Don't Fuss Daycare is located, perhaps Ms. Bygones, will presumably lose similarly, so the total loss is actually nine times $14,000, or $126,000 This will occur as soon as the

project is approved, if the market understands its implications. Therefore it is already a present value.

At the city's property tax rate of 3% of half the value, these homeowners will pay somewhat less in taxes:

Decreased property taxes on Elm Street=0.03*.5*126,000=$1890

Effects on Don't Fuss Daycare:

Millicent Bygones estimates her loss of income, as owner of Don't Fuss Daycare, $1200 a month, or 12*$1200=$14,400 a year. Since it seems likely that construction on the neighboring property would be just as hazardous and unpleasant for the children in her care as the operating parking structure, it is plausible to assume that this loss begins immediately, in the current year, and lasts until she retires. (One could extend it further, assuming that she sells the business, but I won't.) We don't know her age, but I'll give her 20 years.

PV(FUSS)=$14,400 + 14,400/0.03 –14,400/0.03*(1.03)^20=$228,636

Benefits of Parking:

Though he may have failed to persuade the city to hire his firm, Mr. Herringbone did provide a useful analysis of willingness to pay for parking in Sylvania. According to his figures, at a price $1 the structure would raise $2000 a day, meaning that the demand for parking would be 2000 car-hours. He also reported that at a price of $2, revenues would be $2500, or 1250 car-hours. Taking these as two points on a straight-line demand curve for parking, we find the inverse demand curve:
P=a–bQ
1=a-b2000
2=a-b1250
1=b750
b=1/750=.00133
a=1+b2000=1+(1/750)2000=3.6667
P=3.6667–0.00133Q
where Q is car-hours of parking. Note that when P=0, Q=3.6667/0.00133=2757

Since the plan is to charge a price of zero for parking, we can measure the total benefits of the structure as the total consumer surplus at zero price:

CSPark(t)= ½ (3.6667) (2757) = $5054.5 per day
or $5054.5*365=$1,844,892 per year t=3,4,…

PV(CSPark) = $1,844,892(32.36246)=$59,705,244

Taxpayers:

We have seen that the city will experience a gain in property tax revenues of $6147 from Main Street and a loss of $1890 from Elm Street. More importantly, the city will have to foot the bill for construction of both the theater and the parking structure, at a present value of $3,646,120 and of operating and maintaining both over the future at a present value of $15,624,596. In order to value the project from a social standpoint, we only need to recognize these costs, and compare them to the benefits for other groups.

Summary of Effects of the Bijou Restoration and Parking Structure:

Benefits to Theater-Goers	PV(GOERS)	+$69,237,152
Benefits to Event Sponsors	**PV(SPONS)**	+3,365,696
Costs of Construction	**PV(CONST)**	–3,646,120
Operating Costs	**PV(OPER)**	–15,624,596
Increased Profits of Main Street Merchants		+$113,592,230
Lost Property Value of Elm Street Homes		–112,000
Increase Cost of Don't Fuss Daycare	**PV(FUSS)**	–494,400
Benefits of Increased Parking	**PV(CSPark)**	+59,705,244
Net Benefit or Cost		