Case 43

Bridging the Gap

Stuckagain Heights is a bedroom subdivision of a rapidly growing Alaskan city. It is surrounded by public lands (state park, military reservation, and city park), and its only access is an old army tank trail that has been marginally upgraded. This 3.5-mile gravel road through the city park has 22% grades. The snow and ice season is October through May, so the city's standard for subdivision roads specifies a maximum gradient of less than half that, or 10%. During "breakup" (the spring melt) the gravel deteriorates into mud, and even the large road graders have gotten stuck.

Because of the poor road conditions, this is one of the very few areas of the city that has no mail service, no school buses, and no home delivery of newspapers. This road meets the standard for a "wilderness" park. And in fact, many city residents come to the park for jogging, hiking, skiing, snowmobiling, dog sledding, etc. Thus, users of the city park often jog or park along the road, while residents travel the narrow road at 30 to 40 mph—slowing only for blind curves, for moose, and for accidents.

Unfortunately, major improvements or any realignments of the existing road require the approval of the U.S. Secretary of the Interior. Local environmental activists ensured that subdivision access was specified as a nonconforming use when the land was conveyed from the federal government to the state and thence to the city. They seem likely to oppose any improvements, which will certainly complicate the process of gaining approval from the Secretary.

Nevertheless, mounting traffic levels ensure that the city must face the problem of upgrading the road or building a totally new access. Besides park usage, which has doubled in the last five years as the city's population increased by 60%, there has been a substantial increase in the number of homes in Stuckagain. Ten years ago there were 21 homes, and today there are 73. Traffic surveys indicate that each house generates about 4.8 trips per day. The rate of this growth varies with the city's economy, but zoning and topography indicate that the eventual capacity of the region is 350 to 375 homes.

The residents of Stuckagain prefer development of a new access road, even though it seems likely to be the more expensive alternative. To begin with, they are intimidated by the necessity of obtaining approval from 4500 miles away for the realignments that are essential to upgrading the current road. In addition, many Stuckagain residents are convinced of the basic incompatibility of park use and subdivision access. Since the new road would meet current city standards and since it is somewhat shorter, this road would also greatly reduce the "hassle" and economic costs of travel.

This new access road will pass close to another subdivision, Chugach Foothills, which is completely developed with 600 homes. Their community council violently opposes the new access road. Thus, both "solutions" have some political problems.

The mayor and city manager are caught in the middle. In hopes of generating a factual base, they have asked you to develop specific dollar figures for the new road based on historical analogies. This total cost can be a starting point for evaluating the possibility of upgrading the current road.

One difficulty with the use of analogies is that road construction costs depend so heavily on soil conditions and distances. The availability of on-site gravel can make a fivefold difference in the cost of roadbed construction. The new road passes very near to a site that had been targeted for a gravel pit by the city for 40 years. The mayor claims to be almost certain (90%–95%) that the military will permit use of this site.

The other uncertainty involves route selection for the first mile of the road. If environmental groups accept a route just inside of the city park's boundary, then it will probably be approved by the Secretary of the Interior. This route avoids the cost of crossing environmentally fragile wetlands, which lie just outside of the park. (The route inside the park is also farther from the objecting subdivision, Chugach Foothills). If this route is not accepted, then an additional $0.5 million to $1 million in project costs will be required to mitigate the environmental damage.

Similar projects from the last construction season had per-mile averages of $25,000 for surveying and design, $33,000 for clearing and site preparation, and $45,000 for roadbed

construction. These costs vary by location, particularly due to the amount of dump truck travel that is required. Unlike this project, most projects required off-site gravel and off-site disposal of slash and overburden. So, the preliminary estimate for this road was only $25,000/mile for the combined clearing and construction costs. Since construction has slumped some, it seems likely that costs will be 5% to 10% lower than last year. Furthermore, the new route is more direct than the meandering tank trail (2.8 miles vs. 3.5).

The "new" access road would require that a new bridge be built to cross the creek. Because of the importance of this segment, preliminary estimates were already made for three alternatives. The results of the cost estimates for the timber, steel, and reinforced concrete structures are summarized in Table 43-1.

Table 43-1 Bridge Costs (in $1000s)

	Wood	Concrete	Steel	Approaches
First Cost	$350	$575	$480	$300
Painting	$10	$3	$15	
Interval (years)	3	0	5	
Repair	$20	$15	$15	$110
Interval (years)	5	5	5	25
Annual Maintenance	$55	$30	$25	
Life (years)	20	40	30	100

Maintenance for the new road on a per-mile basis will cost about the same as the existing road. These costs have averaged $1500 for grading, $2500 for snow removal, and $1000 for sanding. The only exception is one very steep hill (0.45 miles long) that requires grading twice as often year-round and that incurs 90% of the sanding bill each winter. This hill will be closed to traffic and converted to a sledding hill for the park—if a new access road is built. The rest of the existing road will be maintained for park use only, and this lower level of use should cut its maintenance bill per mile in half.

In evaluating projects of this kind, the city uses a 12% discount rate. Estimate life-cycle costs for the various alternatives, and identify required values for accident prevention and travel-time savings that would support your recommendations.

Options

1. Simplify the problem by only analyzing the bridge alternatives under different assumptions for project life and salvage value, using EUAC and/or PW approaches. Is the assumption of project life important here?

2. If the project does not make sense yet, at what point will traffic increases for the park and the subdivision justify a new access road?

3. Which uncertainties are most critical for project justification: availability of gravel, route selections along park boundary, growth in traffic levels, accident rates, construction costs, discount rate, or ?????

4. Construct and compare three realistic scenarios, ranging from nearly the "most" to nearly the "least" favorable for the new road.

5. Construct a cost/trip measure based on the current level of traffic, on an equivalent annual number of trips, and on the maximum level of traffic expected.