1.011 Project Evaluation
CEE Projects & Accessibility:
Case Studies

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1. Chesapeake Bay Bridge
2. BART
3. Transcontinental Railroad

Benefits of Improved Access

- Reduced transport costs for existing users
  - Lower transport expense ($ saved)
  - Less travel time (hrs saved x value of time)
  - Fewer accidents ($, injuries, fatalities avoided)
- Increased demand for transportation
  - Additional consumer surplus (difference between value of trip and cost of trip)
- Changes in economic geography
  - Increased land values and development potential
  - More location options for time and $ constraints
  - More options for trade (spatial price equilibrium)

Chesapeake Bay Bridge & Tunnel

- Overview
  - Construct 17.6 mile bridge & tunnel to cross mouth of Chesapeake Bay and connect Norfolk VA and tip of Delmarva Peninsula
- Motivation
  - Seasonal access to excellent beaches
  - Alternate to I-95 for interstate traffic (shorter, less congested route between VA and Delaware)
- Financing
  - Raise construction funds through bonds
  - Pay principal & interest from tolls

Background: Chesapeake Bay Bridge-Tunnel

- 1920s - various private ferry services
- 1930 - Chesapeake Bay Ferry Commission
  - Issued bonds to buy out private ferry companies
  - Established regular shuttle service
- 1955 - Lucius Kellam, member of the Commission pushed for permanent crossing
  - VA General Assembly approved concept, authorized study of bridges and tunnels
  - US Navy would not accept a bridge; 17.6 mile tunnel deemed too expensive; selected a combination
- 1960 - Commission became "Chesapeake Bay Bridge-Tunnel Commission

Financing: Chesapeake Bay Bridge-Tunnel

- $200 million raised from sale of bonds to build bridge
  - Three levels, with increasing interest rates
  - Annual financing costs approx. $13 million (30 years at 5%)
- Substantial tolls possible because of markets served ($10/auto, $60/truck)
  - Tolls averaged $20 million per year and were immediately able to cover bond interest payments
- Expansion also financed through tolls
  - Parallel Crossing - will eventually create a second two-lane bridge
  - Parallel Tunnels - after Parallel Crossing is completed

Chesapeak Bay Bridge-Tunnel: Issues

- Threat to private ferry operators
  - Legislature created Commission with authority first to operate the ferry service and then to become the bridge commission
- Naval security - required more expensive approach
- Disruption of the Bay's ecosystem
  - The islands built for the tunnel exits became bird sanctuaries
- Capacity
  - The 2-lane facility is congested during peak periods
  - Pace of expansion is balanced against ability to finance through tolls

Bay Area Rapid Transit System

- Overview
  - Construct 81 mile automated rail transit system with 37 stations in four counties around San Francisco and a 3.8 mile tube under Oakland Bay
- Motivation
  - Relieve traffic congestion and reduce dependence upon auto
  - Provide transit option for commuting
- Financing
  - Local taxes to finance construction
  - Fares to cover a portion of operating cost
  - Local taxes to cover operating deficit
  - Federal funds for expansion

BART: Selected Milestones

- 1946 - formation of committee to look at traffic problems
- 1957 - report of Bay Area Rapid Transit Commission recommending "total development plan" before transit decision
- Early 1960s: State legislature formed 5-county BART district; public narrowly approved financing
- 1964 - testing & design began
- 1966 - construction began
- Mid-1972 - operations begun
- 1991 - major capital improvement campaign

BART: Issues

- Financing with tax money: one county backed out of project because of tax issue
- Inflation: inflation was 3% at time of planning, but 7% at time of construction
- Market: (affluent) suburban commuters or (poorer) urban dwellers
- Expansion: how to finance what most agreed was necessary and desirable expansion to the airport (finally begun in 1991 with federal funds)
- Automation: how much automation is needed?
- Engineering: Golden Gate Bridge could not carry trains, so Marin County was out

BART: Financing Problems

- Costs totaled $1.7 billion (which would require over $110 million/year to repay over 30 years @ 5%)
- Fares for the system would only cover $30-40 million, leaving a substantial operating deficit (for 132,000 daily passengers in the first few years after system opened in 1972 - barely half of projections)
- Area-wide sales tax of 0.5% was added to cover construction overruns and operating deficits (approx. $50 million/year)
- System cannot generate profits and therefore needs state or federal support for capital projects
- Benefits to local economies translate to support only through a political process - but the benefits are real!

BART: Early Benefits

- Traffic diverted from the Oakland Bay Bridge
  - 4,000 fewer vehicles/day when tube opened
  - But, traffic returned to pre-BART levels in less than two years
- Approx. 2,000 new trips on BART across the Bay
- BART market share of about 30% for commuting trips in relevant corridors and 20% for all trips
- Expansion of metropolitan area

Transcontinental Railroad

- Overview
  - Construction of railroad linking Omaha, NE and Sacramento, CA
  - Dramatic reduction in transport time and cost
- Motivation
  - Connect California to the rest of the country
  - Open the west for development
- Financing
  - Federal payments for construction work
  - Federal donations of land to operating companies

Transcontinental Railroad: Selected Milestones

- 1819 - first mention of idea (given technology, the idea for a project is not a great leap!)
- 1836 - Asa Whitney's proposal and advocacy
- 1849 - RR convention studied merits of routes, recommended St. Louis - San Francisco
- 1850s - Congress couldn't decide which route (via New Orleans, St. Louis, or Chicago-Omaha)
- 1853 - Gadsden purchase - for best rail route in SW
- 1856 - surveys of routes completed
- 1862 - in midst of war, N route was only possibility! And, congress now could act.
- 1869 - first trip

Trans. RR: Financing

- Congress paid for construction
  - $48,000 per mile in mountains
  - $12,000 per mile in plains
- Land grants:
  - The railroads were given a 200-ft right-of-way
  - Alternate 10-mile by 10-mile sections were given to the railroads (worth $2 billion - once they were accessible!)
  - The government kept the rest of the land
- Contractors (UP and CP RRs) could raise funds based upon these federal grants
- Reduced rates for government goods: these lasted until 1930s - a major benefit

Trans. Railroad: Selected Issues

- Manpower
  - Midst of Civil War!
  - Used 20,000 Chinese on Central Pacific route
  - Used 10,000 Mormons and many foreigners (mostly Irish) on UP route
- Corruption
  - Vast sums attract brilliant, but unscrupulous financiers
  - Difficult to verify that funds were used to pay for construction; many scandals
- Conflicts with indians
- Quality vs. cost of construction
  - Rickety bridges, tight curves, and steep grades

Comparison of the Projects

	CBBT	BART	TCRR
Financing	Simple	Complex	Innovative
Benefits	Access	Congestion reduction	Security Connectivity Development
Public Role	Authority	Authority Funds	Authority Funds Development User