



Aggregate Resource Mapping Program

Aggregate Availability



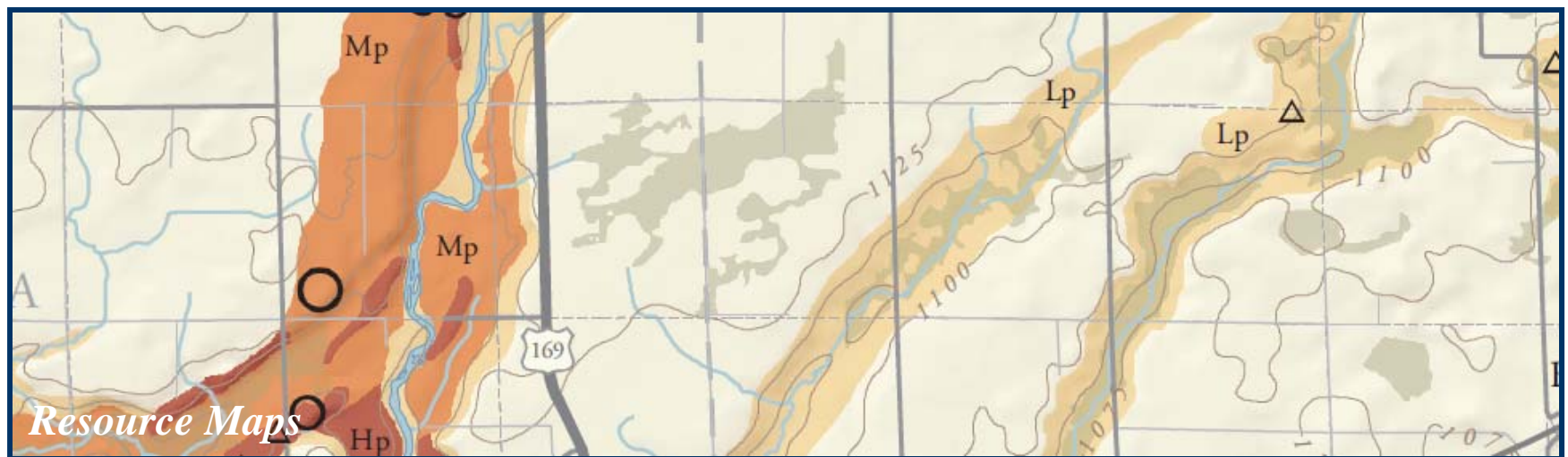
Sand and Gravel



Reclaimed Gravel Pit



Fieldwork



Resource Maps



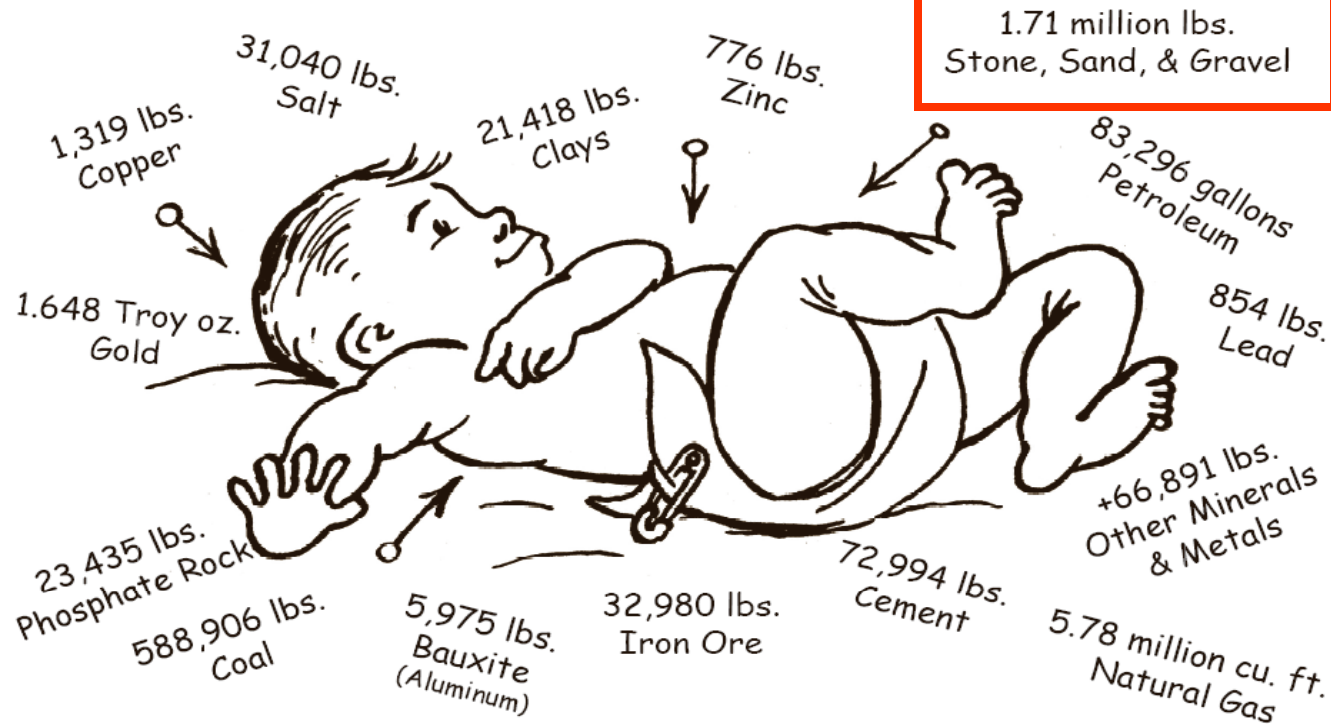
Three factors affect the local availability of construction aggregates

1. **DEMAND:** Consumption of aggregate
2. **SUPPLY:** Natural distribution of aggregate resources
3. **LAND-USE CONFLICTS:**
 - Encroachment around existing gravel mining areas
 - Development on top of future aggregate resources
 - Difficulty of permitting new mines
 - Competing land uses such as perpetual conservation easements

DEMAND

People use resources in everyday life

Every American Born Will Need . . .



3.7 million pounds of minerals, metals, and fuels in their lifetime

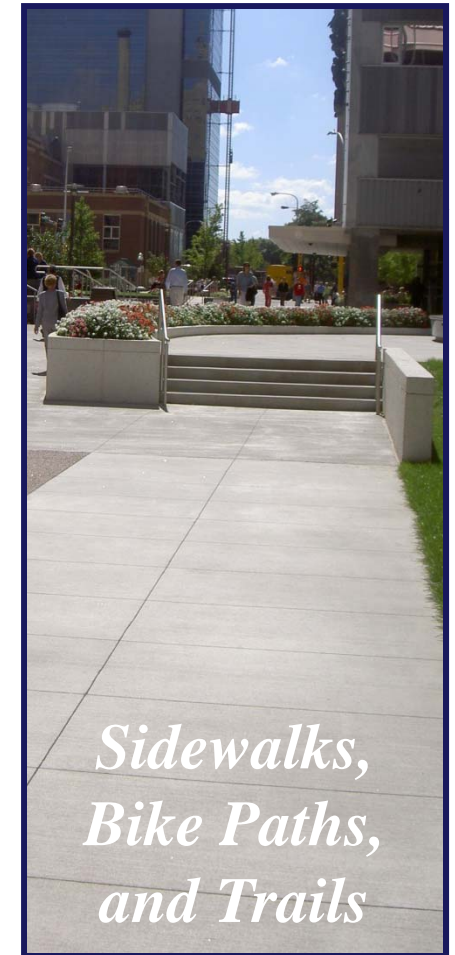
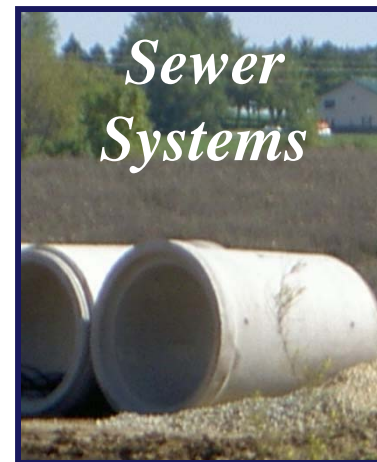
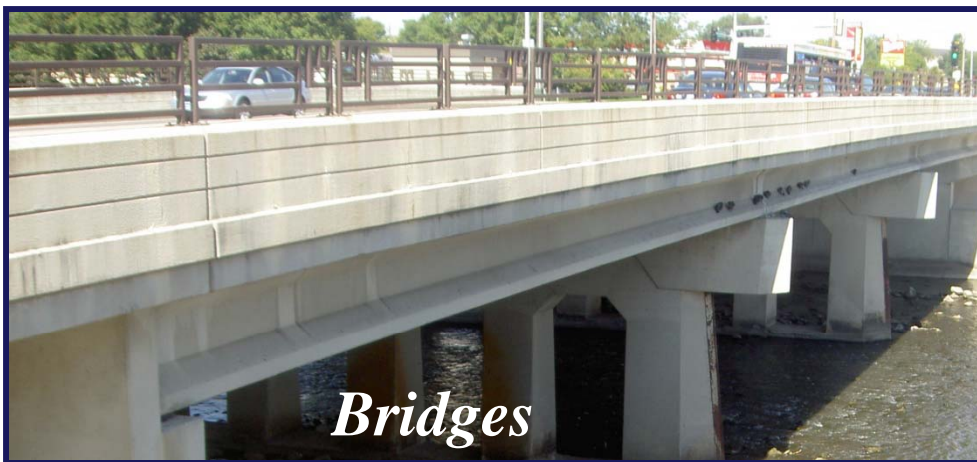
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DEMAND

Aggregate makes up ~80% of concrete

Concrete is used to build.....





DEMAND

Aggregate makes up ~90% of asphalt

Asphalt is used for.....





DEMAND

Long-term pattern of aggregate use in MN

25% Roads

(building and maintaining 134,000 miles of public roads and bridges)

25% Public Works

(i.e. sewer/water systems and other infrastructure)

25% Private Residential Construction

25% Commercial Construction

Approximately 50% of aggregate is consumed with public tax dollars



DEMAND

2009 Market conditions of aggregate use in MN

1. *Reduced demand for aggregate within the housing and commercial markets*
2. *Expected increased demand of aggregate for publicly funded projects*



DEMAND

Influences on future demand of aggregates

- 
- A photograph of a construction site with a large crane and several cars parked in the foreground, serving as a background for the list.
- **Population Growth**
 - **Personal Income**
 - **Statewide Economic Growth**
 - **Interest Rates**
 - **State Infrastructure Needs**



SUPPLY Geology and Aggregate



Sand and gravel



Limestone for crushed stone

Aggregate occurs
where nature
placed it, not
where people
need it.*

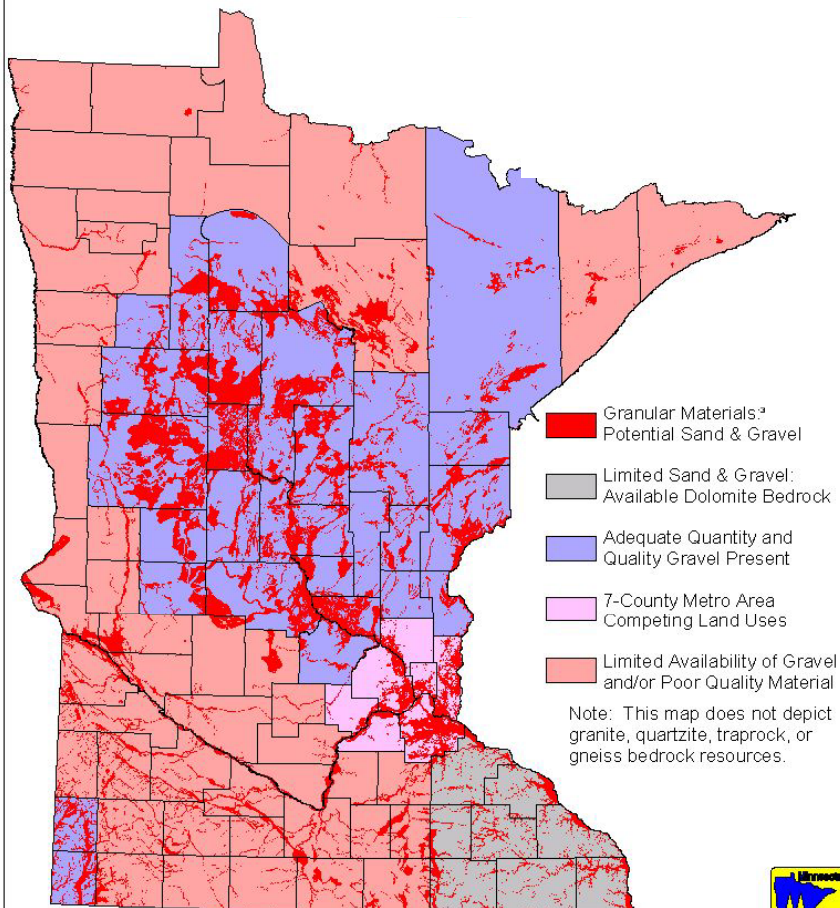
** Langer, W.H, and Glanzman, V.M, 1993, Natural Aggregate, Building America's Future, U.S. Geological Survey Circular 1110*

SUPPLY

State distribution of aggregate

Sand and Gravel Distribution in Minnesota

Limited Availability/Poor Quality Material



- This map is a very generalized assessment of the quantity and quality of aggregate resources across the state
- Minnesota's geologic past has created an unevenly distribution of aggregate throughout the state
- The quality of aggregate resources varies across the state
- Some areas have adequate supply of construction aggregate while other areas have natural scarcities

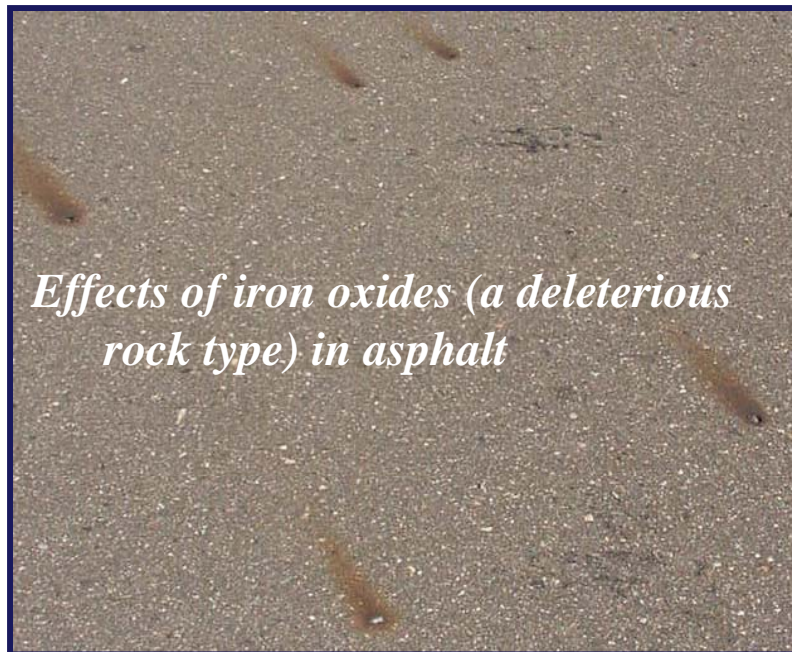


SUPPLY

Example of quality issues

*Not all sand and gravel deposits meet the specifications
for road and bridge construction*

- Sand and gravel deposits contain different types of rock
- The abundance of deleterious rock types can weaken and shorten the life span of roads





SUPPLY

Regional Growth Centers

- Supply of aggregate near populated areas can be limited due land use conflicts
 - **STERILIZATION:** building over a deposits as cities grow into rural areas
 - **ENCROACHMENT:** building near existing quarries and gravel pits
 - **DEPLETION:** extracting the resource in existing mines at a higher rate



SUPPLY and DEMAND Transportation

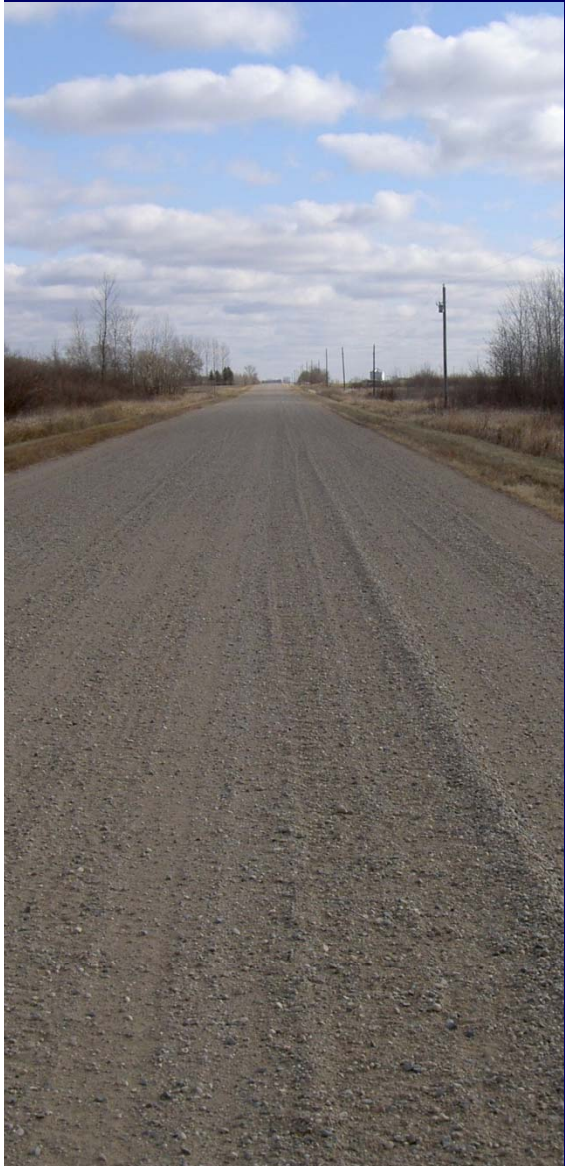


*On average, for every 10 to 14 miles of haul distance
the cost of aggregate doubles in price*

- Aggregate is high bulk, low-value commodities
(one ton of aggregate cost around 10 dollars)
- Transportation accounts for a considerable amount of the delivered price
- Finding and accessing aggregate close to the market reduces the cost of publicly and privately funded construction projects



SUPPLY and DEMAND Availability



Having a local supply of aggregate is an important sustainability issue for maintaining and developing communities of all sizes