CONCRETE PRESERVATION IN URBAN AREAS

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INTERNATIONAL GROOVING AND GRINDING ASSOCIATION
BIG PRESERVATION
EVERYBODY WINS WHEN IT IS FUNDED

Roman Road – Network
Approximately Equal to the US Interstate System--
Cost $3.2 Million per Mile
COMMODITY PRICE INCREASES

Index Value (1958 = 100)

- Last Time Trust Fund Increased
- Asphalt PPI
- Consumer CPI
- Concrete PPI
ROAD BUILDING/PRESERVATION
1993 AND 2014

Funding

- 1993 LETS BUILD 100 MILES OF ROAD
- 2014 LETS BUILD 67 MILES OF ROAD

Arizona Consumption Rate

- 1995 Lets Drive 39.7 Billion VMT
- 2014 Lets Drive 59.6 Billion VMT (50%)
INCREASE IN VEHICLE MILES TRAVELED AND MILES OF ROADWAY (1990-2012)
STANDARDS IN VEHICLE FUEL EFFICIENCY

1. Initial car standard established (1978-85)
2. Light truck standard established (1979-96)
3. Car standard decreased (1986-89)
4. Car standard at 27.5 mpg (1990-2010)
5. Light truck standard at 20.7 mpg (1997-2001)
6. President issues new light truck targets (2005-07)
7. CAFE changed to footprint standard (2008-present)
8. New car and light truck standards established (2012-16)
9. Revised car and light truck standards to take effect (2017-25)
TRANSPORTATION FUNDING BILL EXTENSIONS AND COUNTING

Kipper Williams

GOOD OLD UNCLE CAN KICKER

Get Involved!
It's time to TAKE BACK AMERICA
2010 CENSUS DEFINITION OF URBAN

• URBANIZED AREAS: 50,000 OR MORE PEOPLE

• URBAN CLUSTERS: AT LEAST 2,500 AND LESS THAN 50,000 PEOPLE

• RURAL IS EVERYTHING ELSE
Projections of the Size and Composition of the U.S. Population: 2014 to 2060
Population Estimates and Projections

Current Population Reports
By Sandra L. Colby and Jennifer M. Ortman
Issued March 2015
P25-1143

INTRODUCTION

Between 2014 and 2060, the U.S. population is projected to increase from 319 million to 417 million, reaching 400 million in 2051. The U.S. population is projected to grow more slowly in future decades than in the recent past, as these projections assume that fertility rates will continue to decline and that there will be a modest decline in the overall rate of net international migration. By 2030, one in five Americans is projected to be 65 and over; by 2044, more than half of all Americans are projected to belong to a minority group (any group other than non-Hispanic White alone); and by 2060, nearly one in five of the nation’s total population is projected to be foreign born.

demographic components of change—births, deaths, and net international migration. The projections, based on the 2010 Census and official estimates through 2013, were produced using cohort-component methods. Such methods project the components of population change separately for each birth cohort (persons born in a given year) based on past trends. The base population is advanced each year by using projected survival rates and net international migration. A new birth cohort is added to the population by applying the annual projected fertility rates to the female population. The projections cover the period 2014 to 2060.

The 2014 National Projections are the first series of Census Bureau projections to incorporate separate
Ten Most Populous Urbanized Areas: 2010

Source: U.S. Census Bureau, 2010 Census Urban Area Delineation Program
Beyond Traffic 2045
TRENDS AND CHOICES
U.S. Department of Transportation
POPULATION CHANGE SINCE 2010
FHWA MAY TRAFFIC STATISTICS

- Traffic in the West, a bloc of 13 states including Alaska and Hawaii, climbed to 58.4 billion unadjusted VMT, a gain of 5.3 percent over the previous March and the 18th consecutive month of increased traffic for the region. The South Atlantic, a region of seven states and Washington, D.C., rose sharply by 5 percent over the previous March to 57 billion VMT.

- At 9.5 percent, Montana led the nation with the largest unadjusted single-state traffic percent increase compared to the same month a year earlier, followed closely by South Dakota at 9.0 percent and Hawaii at 8.2 percent.
BEYOND TRAFFIC

Population Increase
2015: 320 million people
2045: 390 million people
In 30 years our population is expected to grow by about 70 million... that’s more than the current populations of NY, TX, FL.

Older Americans — Redefining Longevity
By 2045, the number of Americans over age 65 will increase by 77%.
About one-third of people over 65 have a disability that limits mobility. Their access to critical services will be more important than ever.

Millennials — Shaped by Technology
There are 73 million Millennials aged 18 to 34. They are the first to have access to the internet during their formative years and will be an important engine of our future economy.
Millennials are driving less. By the end of the 2000s, they drove over 20% fewer miles than at the start of the decade.

Income Inequality
10% of the population takes home one-third of our national income. Transportation is the second-largest expense for U.S. households.

Megaregions and Shifts in Population Centers
11 megaregions are linked by transportation, economics, and other factors. They represent over 75% of our population and employment.
In 2014, 365,000 people moved to the South—up 25% from 2013—and moves to the West doubled.
PEAK PERIOD CONGESTION ON THE NHS 2011 TO 2040
WHY CONCRETE PAVEMENT PRESERVATION
BELLEFONTAINE, OHIO 1925

2016 = 125th Anniversary

MAIN STREET PAVED IN 1891.

1ST CONCRETE STREET IN AMERICA
BELLEFONTAINE, O.
2016 = 123rd Anniversary

122 Years Old
CONCRETE PAVEMENT PRESERVATION GUIDE
### CP TECH CENTER PAVEMENT PRESERVATION WORKSHOPS

<table>
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<tr>
<th>Date</th>
<th>Location</th>
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<tbody>
<tr>
<td>October 5-8, 2015</td>
<td>Northern California</td>
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<tr>
<td>October 20, 2015</td>
<td>Illinois</td>
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<tr>
<td>October 19-22, 2015</td>
<td>Southern California</td>
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<tr>
<td>November 4-5, 2015</td>
<td>Nebraska</td>
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<tr>
<td>December 14-17, 2015</td>
<td>North Dakota</td>
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<tr>
<td>March 28-31, 2016</td>
<td>State of Washington</td>
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TYPICAL CONCRETE PRESERVATION ACTIVITIES

- DIAMOND GRINDING OR DIAMOND GROOVING
- PARTIAL DEPTH OR FULL DEPTH PATCHING
- DOWEL BAR RETROFIT
- JOINT SEALING OR RESEALING
- SLAB JACKING
- LONGITUDINAL CRACK STITCHING
Grinding Concrete
DIAMOND GRINDING EQUIPMENT
DIAMOND GRINDING
DIAMOND GRINDING
DIAMOND GRINDING

- Improves Friction
- Reduces Noise
- Removes Faulting
- Improves Ride
CALTRANS HAS DETERMINED THAT THE AVERAGE LIFE OF A DIAMOND GROUND PAVEMENT SURFACE IS 17 YEARS AND THAT A PAVEMENT CAN BE GROUND AT LEAST THREE TIMES WITHOUT AFFECTING PAVEMENT STRUCTURALLY.
NGCS IS A DIAMOND GRINDING PROCEDURE
DIAMOND GROOVING

- Cutting parallel grooves into the pavement using diamond saw blades
- Longitudinal (more common) or transverse

Benefits
- Improved wet weather friction
- Reduction in splash and spray
DIAMOND GROOVING
SPLASH AND SPRAY DURABILITY

ARFC

Longitudinally Grooved PCCP

March 2006 after 143 Days w/o Rain
FULL-DEPTH REPAIRS

• “WORKHORSE” TREATMENT

• REMOVAL/REPLACEMENT OF CONCRETE PAVEMENT AT DETERIORATED JOINTS/CRACKS

• FOCUS ON WORKMANSHIP
  • DOWEL BAR INSTALLATION

• NEED FOR RAPID OPENING TIMES
  • ACCELERATED MATERIALS

• PRECAST REPAIRS
FULL DEPTH REPAIR
If distress greater than $\frac{1}{3} - \frac{1}{2} D$

FULL DEPTH REPAIR

May also need to:
Stabilize
Sub Base
FULL DEPTH REPAIR
PARTIAL-DEPTH REPAIRS

• REMOVAL AND REPLACEMENT OF SMALL, SHALLOW AREAS OF DETERIORATED CONCRETE

• EXPANDED USE AS REPAIR TECHNIQUE

• GREATER USE OF MILLING FOR PREPARATION
  • PRODUCTIVITY
  • BONDING

• NEW PATCHING MATERIALS
PARTIAL DEPTH REPAIRS

- REPAIRS DETERIORATION IN THE TOP 1/3 – 1/2 OF THE SLAB.
- GENERALLY LOCATED AT JOINTS, BUT CAN BE PLACED ANYWHERE SURFACE DEFECTS OCCUR.
DOWEL BAR RETROFIT

Also need to:
Reseal Joints
LOAD TRANSFER RESTORATION (DBR)

- PLACEMENT OF LOAD TRANSFER DEVICES ACROSS JOINTS OR CRACKS OF EXISTING PAVEMENTS

- CANDIDATE PROJECTS
  - POOR LOAD TRANSFER (< 60 %)
  - PUMPING
  - FAULTING
  - CORNER BREAKS
SEALING AND RESEALING

- Reservoir
- Backer Rod
- Sealant Nozzle
Slab Stabilization/Jacking
Cross Stitching
CROSS STITCHING

Top View

Transverse Joint

See Note A  24 in. min.

Cross-stitch Holes (Typ.)
(Alternate sides of crack)

Cross-sectional View

See Note B

0.75-in. dia. Rebar
Epoxy into Place

Note A: Distance between holes is 24 in. for heavy traffic; 36 in. for light traffic

Note B: Determine distance from longitudinal crack to hole based on slab thickness T and drill angle. Slabs less than 12 inches thick require a 35° insertion angle.
WHAT IS DIFFERENCE IN THE URBAN ENVIRONMENT

$$\text{EXPENSE}$$

AND

$$\text{TRAFFIC}$$
URBAN ENVIRONMENT ISSUES - GENERAL-

• GETTING IN AND OUT OF TRAFFIC
  • SOMETIMES DIFFERENT EQUIPMENT REQUIRED- NO SEMIS
• WORK IS OFTEN ON A SMALLER SCALE
• SOMETIMES OLDER PAVEMENTS AND POORER CONDITION
• LODGING OFTEN MORE EXPENSIVE OR FURTHER AWAY
• LOWER PRODUCTIVITY
  • SHORTER CLOSURES
  • MORE DIFFICULT SCHEDULES
• MAINTENANCE AND PROTECTION OF TRAFFIC
• PRODUCT SELECTION
# FHWA Performance Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Surface</th>
<th>Assessment</th>
<th>Population Consideration</th>
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<tr>
<td><strong>IRI (in/mi)</strong></td>
<td>All Pavements</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Good</td>
<td>Fair</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;95</td>
<td>95 - 170</td>
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<tr>
<td></td>
<td>Population &lt; 1 Million</td>
<td>Good</td>
<td>Fair</td>
</tr>
<tr>
<td></td>
<td>Population &gt; 1 Million</td>
<td>Good</td>
<td>Fair</td>
</tr>
<tr>
<td></td>
<td>No Population Considerations</td>
<td>Good</td>
<td>Fair</td>
</tr>
<tr>
<td><strong>Cracking Percent</strong></td>
<td>Asphalt</td>
<td>Good</td>
<td>Fair</td>
</tr>
<tr>
<td></td>
<td>Jointed PCCP</td>
<td>&lt;5</td>
<td>5 - 10</td>
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<tr>
<td><strong>Rutting (in)</strong></td>
<td>Asphalt</td>
<td>No Population Considerations</td>
<td>Good</td>
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<tr>
<td></td>
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<td>&lt; 0.2</td>
<td>0.2-0.4</td>
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<tr>
<td><strong>Faulting (in)</strong></td>
<td>Jointed PCCP</td>
<td>No Population Considerations</td>
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<td>&lt; 0.05</td>
<td>0.05-0.15</td>
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<tr>
<td><strong>Cracking Percent</strong></td>
<td>CRCP</td>
<td>No Population Considerations</td>
<td>Good</td>
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<tr>
<td></td>
<td></td>
<td>&lt; 5</td>
<td>5 - 10</td>
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</table>
URBAN ENVIRONMENT ISSUES - DIAMOND GRINDING -

• GETTING WATER AND DISPOSAL OF SLURRY

• DIFFICULTY IN SLURRY DISPOSAL
  • TYPICALLY FURTHER HAUL
  • MAY HAVE TO USE TREATMENT PRIOR TO DISPOSAL

• SUB URBAN LEVEL OF EXPECTATION IS MORE DIFFICULT--GRINDING AROUND MANHOLES WATER VALVES

• INTERCHANGES

• BUSINESS ENTRANCES
Utility Adjustments are Optional
MANHOLES DO NOT REQUIRE ADJUSTMENT
NO ADDITIONAL WORK AT DRIVEWAY ENTRANCES
DOUGLAS COUNTY 500,000 sq yds OF DIAMOND GRINDING

0 to 150 in/mi

>150 to 300 in/mi

>300 to 400 in/mi
UTILITY CUT REPAIRS

- OPENING STREET TO GAIN ACCESS TO UTILITIES
- ON-GOING ISSUE OF RETURNING PAVEMENT TO GOOD CONDITION
- GUIDANCE ON:
  - SIZING CUTS
  - CREATING/REMOVING
  - JOINTING
  - BACKFILLING
  - EMBEDDED STEEL
  - OPENING TO TRAFFIC
URBAN ENVIRONMENT ISSUES
- DBR, SEALING, PARTIAL AND FULL DEPTH SLAB REPAIR -

• PRODUCT SELECTION AND INSTALLATION PROCEDURES
• PRODUCT SELECTION AND INSTALLATION PROCEDURES
• PRODUCT SELECTION AND INSTALLATION PROCEDURES
PRECAST CONCRETE REPAIRS

• ADVANTAGES
  • BETTER QUALITY CONCRETE
  • CONTROLLED CURING
  • MINIMAL WEATHER IMPACTS
  • RAPID OPENING
  • EXPERIENCE IN CA, CO, MI, DE, MN, MO, NJ, NY, IL, UT, VA
  • GOOD PERFORMANCE TO DATE
RAPID STRENGTH CONCRETE FOR PAVEMENTS (Extreme cases)
RSC is typically proportioned with superplasticizers for achieving desired (often near-flowable) consistency while maintaining low water to cement ratio (W/C). Hydration controlling admixtures extend time within which RSC retains workable consistency. Optimized consistency and cohesiveness accelerate construction of pavements.
Limited bleeding of RSC allows for prompt finishing. Fast setting of RSC and subsequent accelerated gain of tensile strength mitigate risk of plastic shrinkage cracking associated with the use of low-bleeding concrete.
SUMMARY

• CONCRETE PAVEMENT PRESERVATION WORKS IN ALL ENVIRONMENTS AND BASED ON TRAFFIC AND SCHEDULE THE APPROPRIATE TECHNIQUES AND PRODUCTS NEED TO BE SELECTED

• URBAN CONSTRUCTION IS GENERALLY MORE DIFFICULT AND MORE EXPENSIVE

In 1983, president Reagan passed a gas tax increase and was re-elected in 1984
TALKING POINTS

• WHAT ARE THE COMMON PAVEMENT PRESERVATION TREATMENTS USED IN URBAN AREAS?
• WHAT ARE THE BENEFITS OF PRESERVATION FOR CONCRETE?
• IS THERE ENOUGH PCC PAVEMENT PRESERVATION, OR SHOULD MORE BE DONE?
• PCC PAVEMENT PRESERVATION RESEARCH. IS IT BEING DONE AND OR SHOULD MORE BE DONE?
• SUGGESTIONS ON WHAT STATE AND LOCAL TRANSPORTATION OFFICIALS CAN DO TO IMPROVE PRESERVATION FOR CONCRETE.
  • EXAMPLES OR BEST PRACTICES FOR TRACKING PRESERVATION FOR CONCRETE WITHIN A PMS TRACKING / REPORTING PERFORMANCE OF PROJECTS IN PMS SYSTEMS.
THANK YOU

AND

VISIT US ON THE WEB

www.igga.net

Diamond Grinding