Flexibility in Design

MoDOT's Approach to System Delivery

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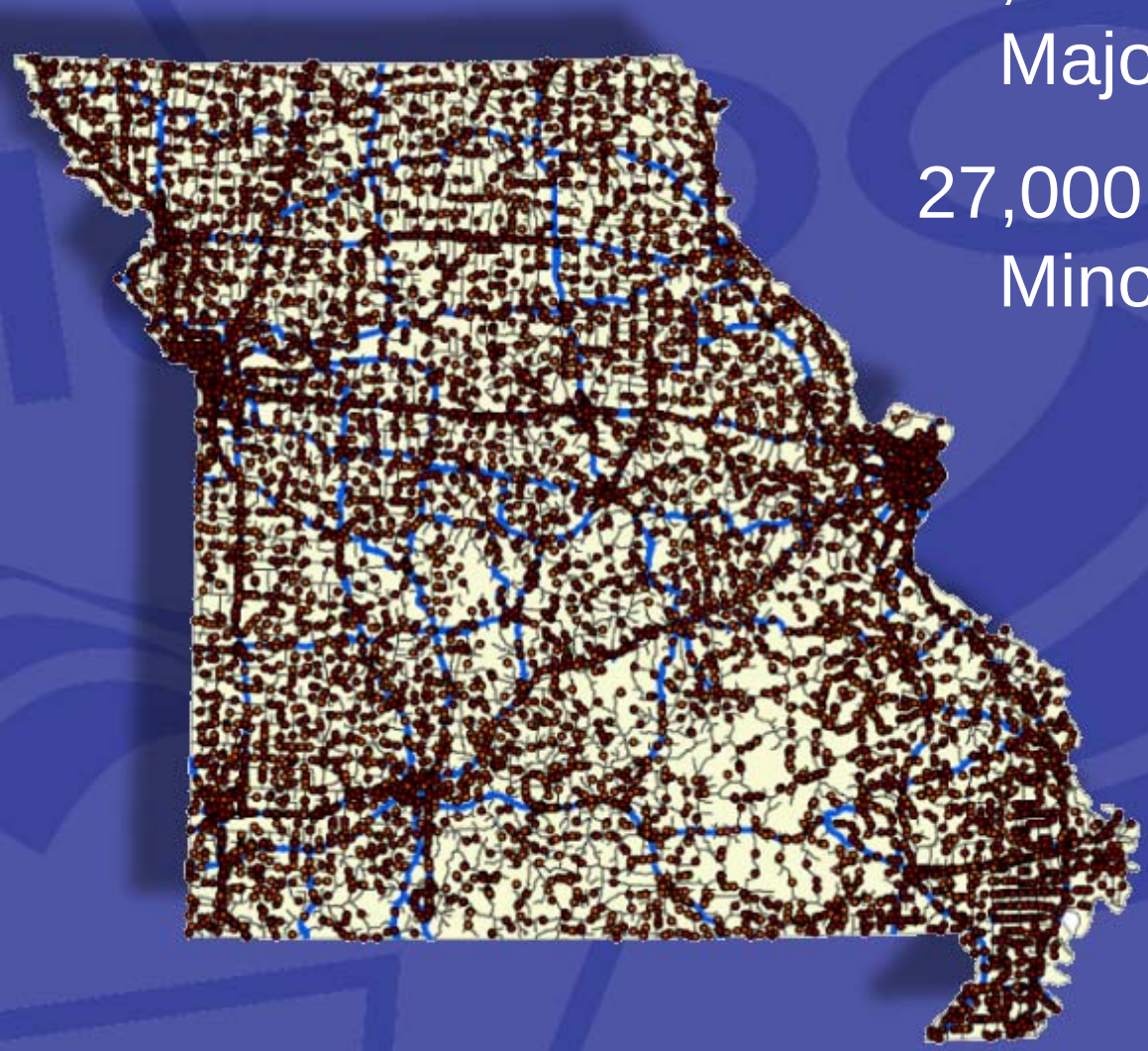
Why be Flexible?

responsibility



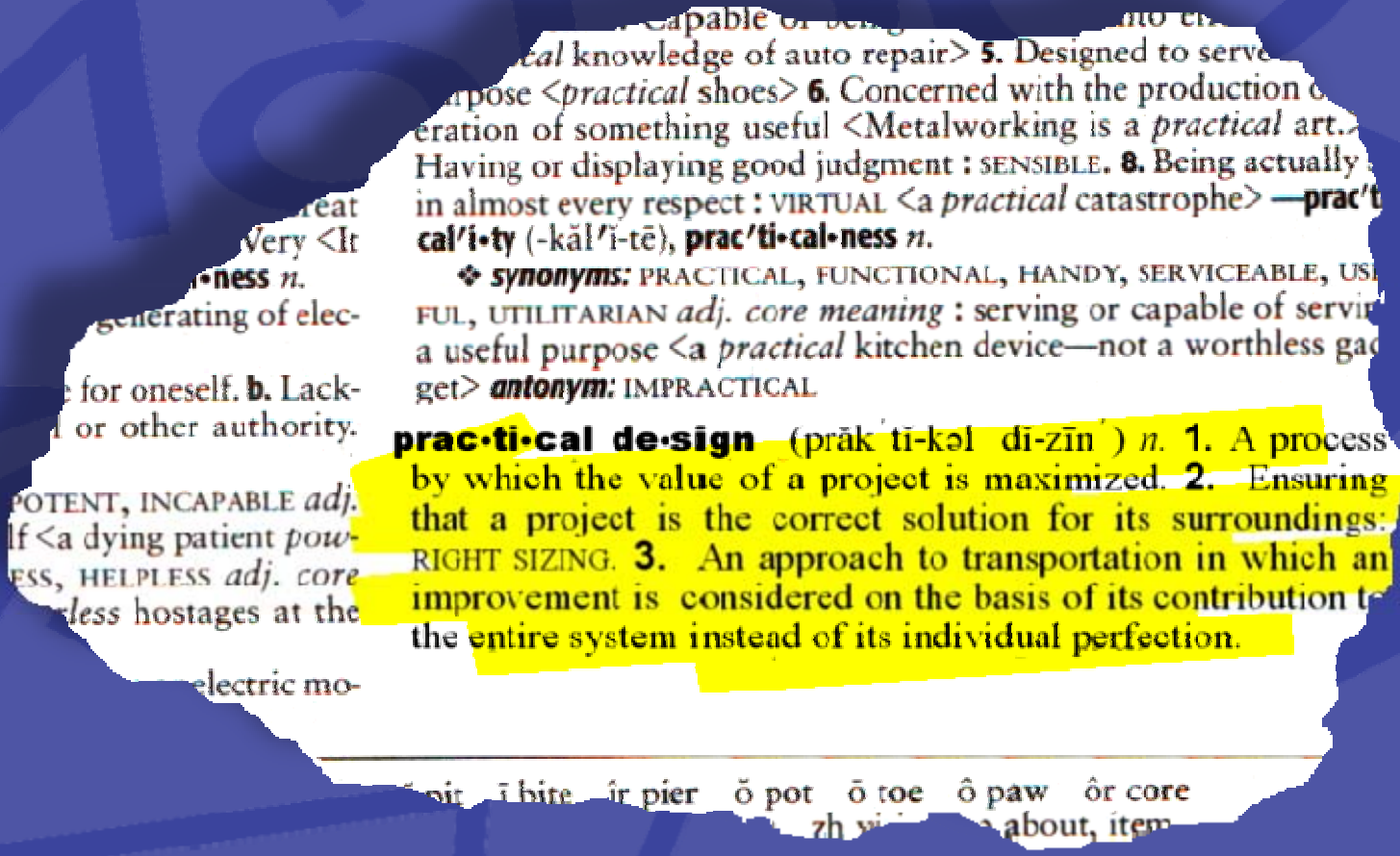
5,000 miles of Major Roads

27,000 miles of Minor Roads

10,000 Bridges

Practical Design = Flexibility

context sensitive solutions



cal knowledge of auto repair> **5.** Designed to serve
rpose <*practical* shoes> **6.** Concerned with the production
eration of something useful <Metalworking is a *practical* art.
Having or displaying good judgment : SENSIBLE. **8.** Being actually
in almost every respect : VIRTUAL <a *practical* catastrophe> —**prac′t**
cal′i•ty (-kăl′ĭ-tē), **prac′ti•cal•ness** *n.*

❖ ***synonyms:*** PRACTICAL, FUNCTIONAL, HANDY, SERVICEABLE, USE
FUL, UTILITARIAN *adj. core meaning* : serving or capable of servi
a useful purpose <a *practical* kitchen device—not a worthless ga
get> ***antonym:*** IMPRACTICAL

prac•ti•cal de•sign (prăk′tĭ-kəl dĭ-zīn′) *n.* **1.** A process
by which the value of a project is maximized. **2.** Ensuring
that a project is the correct solution for its surroundings:
RIGHT SIZING. **3.** An approach to transportation in which an
improvement is considered on the basis of its contribution t
the entire system instead of its individual perfection.

ī bite ir pier ŏ pot ō toe ô paw ôr core
zh about, item

The Dangers of Rigid Standards

the way things were

ENGLISH

CHAPTER IV
DETAIL DESIGN

FUNCTIONAL CLASSIFICATION			PRINCIPAL ARTERIALS				MINOR ARTERIALS		COLLECTORS			LOCALS		
			INTERSTATE	OTHERS										
AVERAGE DAILY TRAFFIC (DESIGN)			ALL	<1700	>1700 (2 LN.)	>1700 (4 LN.)	<1700	>1700	<400	400-1700	>1700	<400	400-1700	>1700
DESIGN SPEED (mph)		FLAT	70	60	70	70	50	60	40	50	50	40 (17)	50	50
MINIMUM)	(1)	ROLLING	70	50	60	60	50	50	30	40	50	30	40	40
		MOUNTAINOUS	NA	40	50	50	40	50	20	30	40	20	30	30
TYPICAL SECTION		DRAWING NUMBER	D-81	D-80	D-83	D-81	D-84	D-82	D-86	D-87	D-85	D-88	D-87	D-89
		LANE WIDTH (ft) MIN.	12	12	12	12	12	12	11	12	12	11	12	12
		ROADBED WIDTH (ft) 2 LN. (2) MIN.	114-128	44	44	114-128	36	40	28(19)	32(19)	40	28(19)	32(19)	40
		RIGHT OF WAY (ft) 2 LN. (3)	250 DUAL	150	150	250 DUAL	120	150	80	80	120	50	80	80
SLOPES (H:V)		BACKSLOPE	SEE PRELIMINARY GEOTECHNICAL REPORT (CHAPTER VI, PROJECT DEVELOPMENT MANUAL)											
	(4)	FILLSLOPE	SEE PRELIMINARY GEOTECHNICAL REPORT (CHAPTER VI, PROJECT DEVELOPMENT MANUAL)											
		FORESLOPE	6:1	6:1	6:1	6:1	4:1	6:1	3:1	4:1	6:1	3:1	3:1	4:1
DITCH DEPTH (ft) (MINIMUM)	(4)		4	4	4	4	2	2	2	2	2	2	2	2
CURVATURE (DEGREE)		FLAT	3	4 3/4	3	3	7 1/2	4 ½	12 1/4	7 1/2	4 3/4	12 1/4	7 1/2	7 1/2
MAXIMUM)	(5)	ROLLING			4 3/4	4 3/4	7 1/2	7 ½	22 3/4	12 1/4	7 1/2	22 3/4	12 1/4	12 1/4
		MOUNTAINOUS			7 1/2	7 1/2	12 1/4	7 ½	53 1/2	22 3/4	12 1/4	53 1/2	22 3/4	22 3/4
SPIRAL CURVES						(15)	NA	(15)	NA	NA	(15)	NA	NA	NA
GRADE (PERCENT)						3	4	3	7	6	5	7	6	6
MAXIMUM)				(18)		4	5	5	9	8	7	10	10	10
							8	7	12	10	10	18	14	14
STOPPING SIGHT DISTANCE (f							400-475	525-650	275-325	400-475	525-650	275-325	400-475	400-475
(MINIMUM-DESIRABLE) (3.5 ft TO 0.5 ft)							400-475	400-475	200-200	275-325	400-475	200-200	275-325	275-325
SAG VERTICAL CURVE							275-325	400-475	125-125	200-200	275-325	125-125	200-200	200-200
(K VALUE)							90-110	120-160	60-70	90-110	120-160	40-40	90-110	90-110
							90-110	90-110	40-40	60-70	90-110	40-40	60-70	60-70
							70	90-110	40-40	40-40	60-70	25-20	40-40	40-40
PASSING SIGHT DIST							20	2100	1500	1800	2100	1300	1800	1800
(MINIMUM) (3.5 ft TO 4.25 ft)							0	1800	1100	1500	1800	1100	1500	1500
								1800	1100	1100	1500	800	1100	1100
MINIMUM PERCENT PASSING SIGHT DIS								60	10	25	50	10	25	50
BRIDGES (NEW)							(2)					(13)	(12)	
								(14)						
BRIDGES (DECK REP							(2)					(13)	(12)	
								(14)						
BRIDGES (USE IN PLA								(15)						
								(15)						
BOX CULVERTS								(14) & (16)						

	FLAT	3	
	ROLLING	4	5
(6)	MOUNTAINOUS	NA	8
	FLAT	625-850	525-650
(7)	ROLLING	625-850	400-475
	MOUNTAINOUS	NA	275-325
	FLAT	150-220	120-160
(8)	ROLLING	150-220	90-110
	MOUNTAINOUS	NA	60-70
	FLAT		2100
	ROLLING	NA	18
	MOUNTAINOUS		
	ITH	NA	

General Design Data Notes

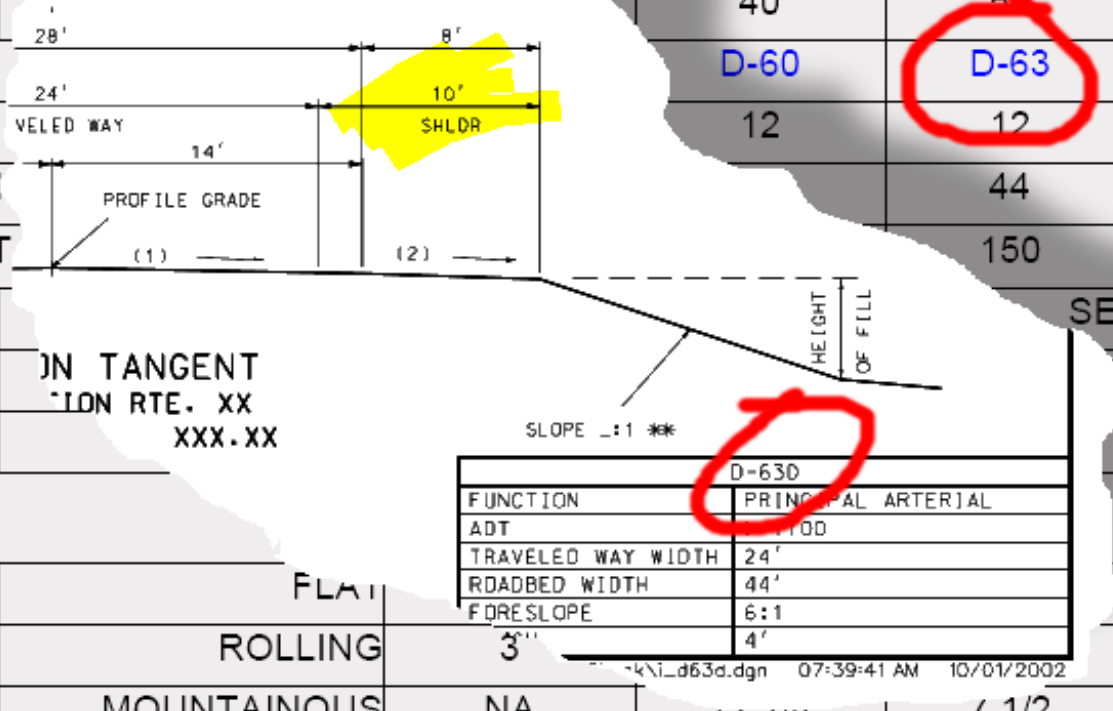
Figure 4-04.1

Sheet 1 of 4
Rev. 11-1-04

The Dangers of Rigid Standards

the way things were

		PRINCIPAL ARTERIALS			
		INTERSTATE	OTHERS		
GN)		ALL	<1700	>1700 (2 LN.)	>1700 (4 LN.)
	FLAT	70	60	70	70
	ROLLING	70	50	60	60
(1)			40	[illegible]	50
			D-60	D-63	D-61
			12	12	12
OADBED WI				44	114-128
RIGHT				150	250 DUAL
					SEE PRELIMINARY GE
(4)	ON TANGENT TION RTE. XX XXX.XX				E PRELIMINARY GE
					6:1
					4
	FLAT				3
(5)	ROLLING	3			4 3/4
	MOUNTAINOUS	NA			7 1/2



The Dangers of Rigid Standards

the way things were

6 ft. Shoulder

10 ft. Shoulder

The Dangers of Rigid Standards

the way things were

Something Had to Change

implementation - *the road to success*

- **Spring 2002** – Performance Spec.s written
- **December 2004** – Practical Design concept pitched to Commission
- **Spring 2005** – Districts challenged to cut STIP 10%
- **Fall 2005** – First Practical Design Policy written
- **December 2006** – *Engineering Policy Guide* is launched

The Road to Success

Winter 2004 – Spring 2005

- After pitching practical design to the State Highway Commission, the Chief Engineer challenged each district to cut the budget of their 5-year STIP by 10% and still deliver the program.
- Beside internal staff, the FHWA and the consulting community were challenged to help
- Engineers were told they could “put their Design Manuals ‘on the shelf ’ for one year”
- Engineers were to be guided only by three ground rules…

The Road to Success

ground rules

- **Safety** - Every project must get safer. There is no room for compromise where safety is concerned.
- **Communication** - There is collaboration in developing every practical solution.
- **Quality** - The practical solution must function properly and cannot leave a legacy of maintenance challenges.

The Road to Success

Immediate results

- The district challenge resulted in an initial savings of $400 Million across the 5-year STIP.
- District representatives were assembled to discuss their experiences, good and bad.
- About 400 ideas and comments were discussed and documented.
- These were boiled down to 25 broad policies in 5 general areas.

The Road to Success

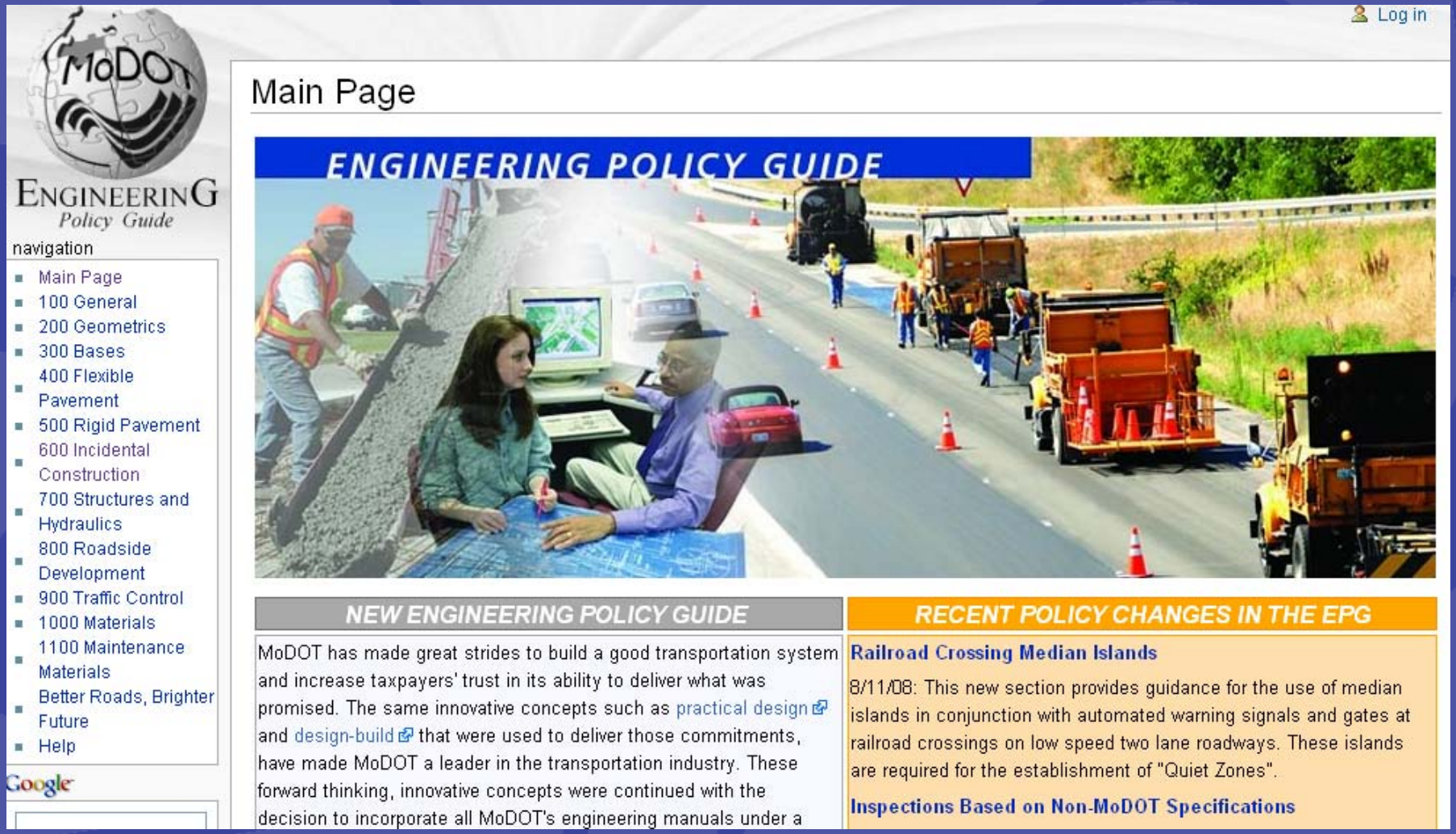
Fall 2005

- MoDOT's entire senior management team and FHWA officials met for two days and crafted flexible policies across the five major areas.
- These five areas accounted for 80% of MoDOT's program delivery expenditures.

1. Paving & Base - 35%
2. Bridges - 17%
3. Grading - 11%
4. Right of Way - 10%
5. Traffic Control – 7%

Everyday Flexibility

engineering policy guide



Has it Worked?

Safety

- Largest drop in traffic-related fatalities of any state in the nation in 2006, with a continued downward trend every year since

- Fatal crashes dropped below 1000 in 2007 and still further in 2008.
MoDOT is on track with even better results for ‘09

- 11% decrease in run-off-road accidents since 2004

Has it Worked?

Quality

- Since 2002, MoDOT delivered a $7.0 Billion program 0.4% under budget.
- Pavement condition on major roads went from the 3rd worst to the 9th best.
- 83% of the state's major roads are now in good condition. That's up from 47% in 2004.

Has it Worked?

Communication

- 90 percent of newspapers editorials in 2008 were positive
- Customer satisfaction with MoDOT rose to 78 % in 2008
- 95% of customers believe projects are the right transportation solution

ROADS&BRIDGES

USA TODAY

MIDWEST Contractor

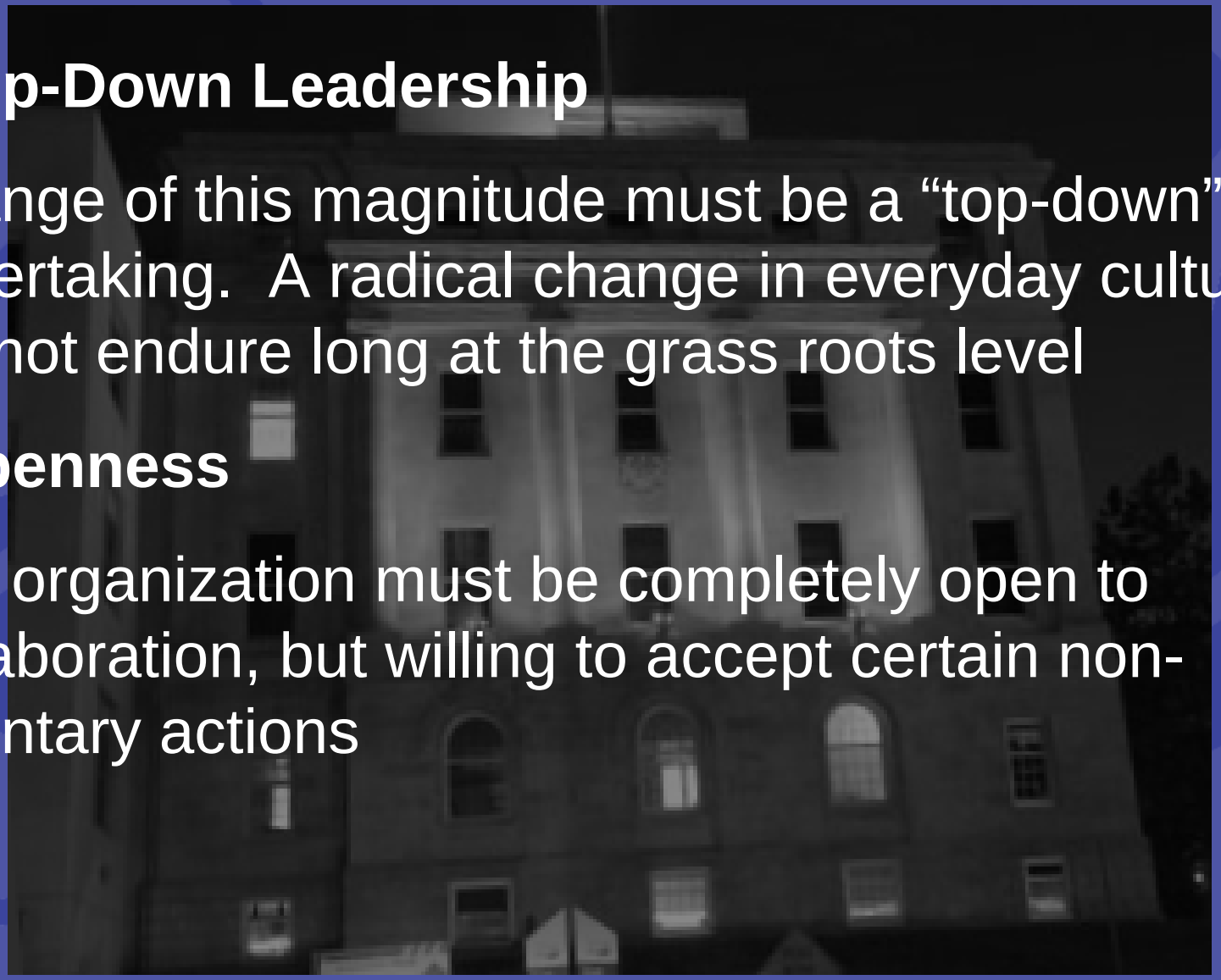
THE KANSAS CITY STAR.

News Tribune

ST. LOUIS POST-DISPATCH

How to be Flexible

lessons learned



- **Top-Down Leadership**

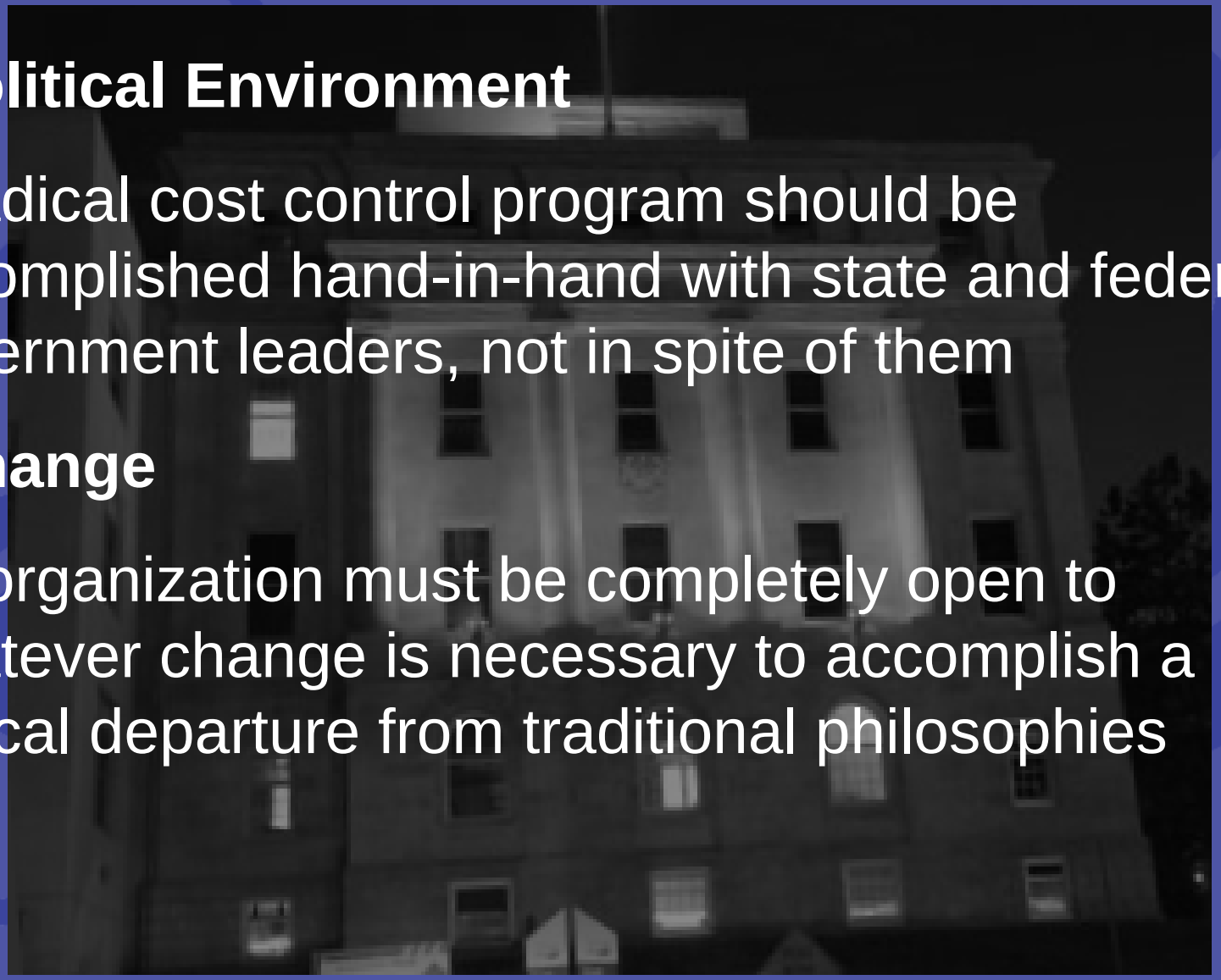
Change of this magnitude must be a “top-down” undertaking. A radical change in everyday culture will not endure long at the grass roots level

- **Openness**

The organization must be completely open to collaboration, but willing to accept certain non-voluntary actions

How to be Flexible

lessons learned



- **Political Environment**

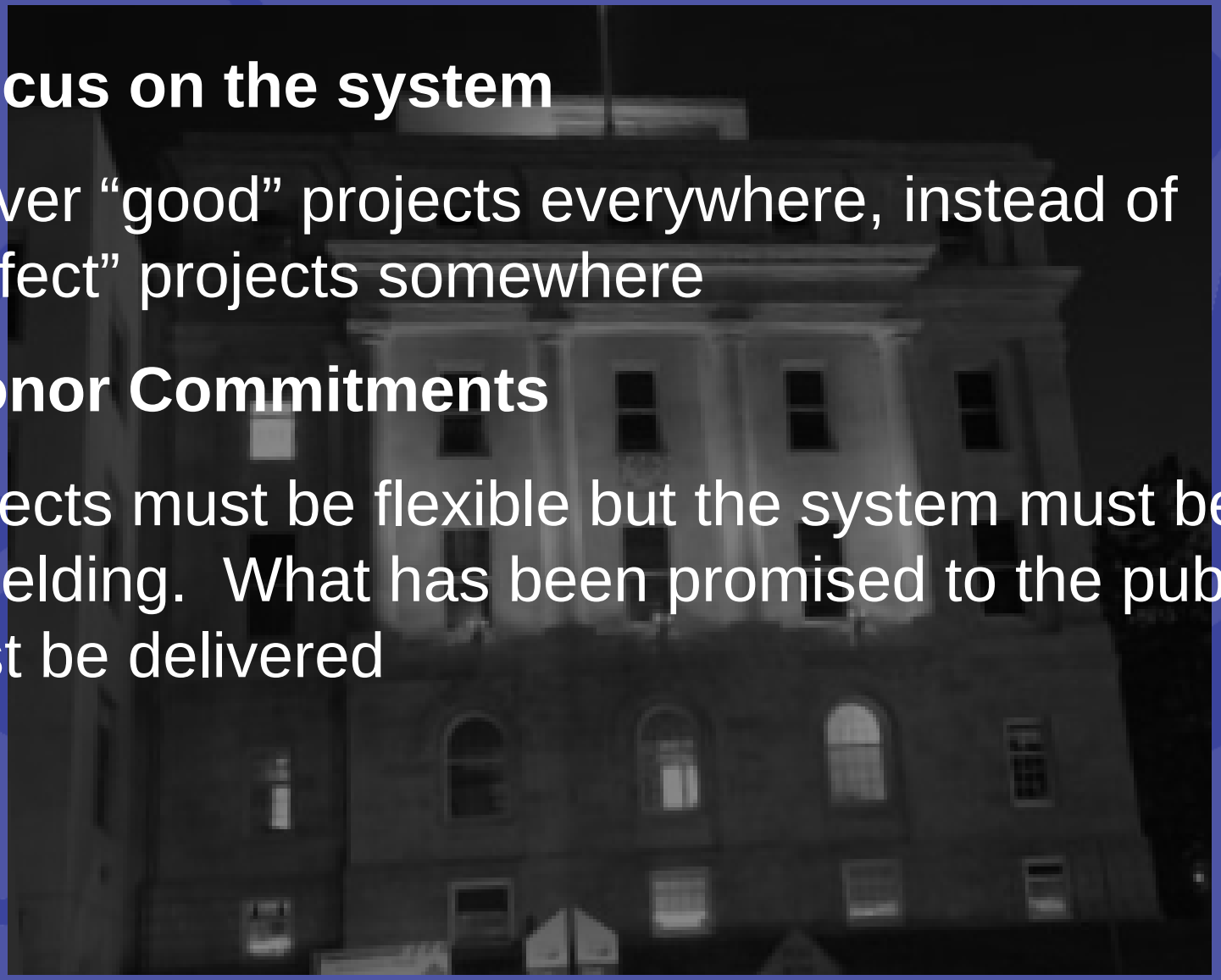
A radical cost control program should be accomplished hand-in-hand with state and federal government leaders, not in spite of them

- **Change**

An organization must be completely open to whatever change is necessary to accomplish a radical departure from traditional philosophies

How to be Flexible

lessons learned



- **Focus on the system**

Deliver “good” projects everywhere, instead of “perfect” projects somewhere

- **Honor Commitments**

Projects must be flexible but the system must be unyielding. What has been promised to the public must be delivered