

& / \$, 5 (\$ 5 , (& / \$ 6 6
' H S D U W P H Q W D Q G (Q U L O L V / Q J
7 K H 8 Q L Y H U V L W \ R I 7 D P S D
: . H Q Q H G \ % O Y G
7 D P S D) /
F F O D V H G F X W

\$ & \$ ' (0 , & 3 2 6 , 7 , 2 1 6

\$ V V L V W D Q W 7 H D F 7 K L H Q 8 Q B L Y R H H V V R U R I 7 D P S D ' H S D U W P H Q W R

3 R V W G R F W R U D O) H O O R Z L Q D 6 W K L (Q X N D R Q K S Q H S B U W I P M Q W

9 R O N V Z D J H Q) R W Q B E W R R Q Q B R H O D U R H L E 8 Q U J Y H U V L W \ R I

\$ V V L V W D Q W 3 U R I H V V R U 1 H Z 2 R D U Q M , I Q Q / J W & D W P X S W H V R (Q J H O F L K V Q R ' Q
' L U H F W R U R I & D P S X V & R Q A R V Q / X F W R U

(' 8 & \$ 7 , 2 1

3 K ' : D V K L Q J W R Q 8 Q L Y H U V L W \ L Q 6 W / R X L V (Q J C
* U D G X D W H & H U W L I L F D W H L Q : R P H Q * H Q G H U
* U D G X B I W H & I Q J D W L R Q
' L V V H U % B I W R L Q W K H & K L F D J R 6 F K R R O / L W H U
6 R F L R O R J \ L Q \$ P H U L B I F W R U \$ Q F D 3 D U Y X

0 (G 8 Q L Y H U V L W \ R I & D O L I R U Q L D D W 5 L Y H U V L G H
6 L Q J O H 6 X E M H F W L Q D Q & I U R G (Q Q D W I T D I O F L K Q

% \$ 8 Q L Y H U V L W \ R I & D O L I R U Q L D D W 5 L Y H U V L G H
6 X P P D F X P 3 Q D X G H W D . D S S D

3 8 % / , & \$ 7 , 2 1 6

- R X U Q U D V O L F O H V

³ 7 K H 7 U H P E O L Q J D 6 1 R F W B R Q B N \ R R U) H H O L Q J 7 K H H % W ' R I % W R K L H V P V L O
) O H H F H 8 6 0 X (Q W K L Q L F / L W H U D W X U H Y R R Q W K H S Q R L W H G D G V D W I

- R X U Q U D V O L F Q U H R / J W Q V V

³ ' \ Q D P L W L F 5 H D G L Q J 6 X V S L F L R Q 6 R F L R O R J \ Q F D K Q Q J 8 U J H Q F \
& D P S D 1 W H Q Y L V H D Q G & U H W X \$ P A X P D U D W W H U O \ I R U / L W H U D W X U H D

& O D

³ & K O R U R I R U P H G \$ Q H V W K H W L F 8 W R S L D Q L V P D Q G) H P L Q L V W
+ H U O D D Q Q G 2 W K H W H R U W W D Q D W W U J D V F X E \$ L - V R X U Q D O R I \$ P H U L F D
: U L W H U V

^{3;} 5 D \ V 3 U R E H \ D Q G R) L Q R S H U W L F L V P L Q 5 X G R O S K) L W R H E U T V ' H W
V X E P L W W W H G U W W X U H D Q G 0 H G L F L Q H

5 H Y L H Z V

³ 6 F U X W D E O H 0 R Q V W U R X V Q Q V V 16 Q V \$ Q H H V D L U Q O D Q R E T) D Q W D V W L
6 X P P H \ D O O S S
“#“0 0

2 W K 3 X U E O L F D W L R Q V

³ 5 R D P L Q J 5 H E H O V 7 K H + L G G H Q / L Q N % H W Z H H Q 7 U D Q V J H Q G
7 U D Q V L W 7 & K H O & W K P U P H R Q 6 H S \ Q H \ P E H U

³ \$ Q (Q J O L V K 3 U R I T V ' H H S ' L Y H L Q W R) D Q I L F W K R Q \$ Q , Q W H U
\$ P S H Q Q P H E U X D U \

\$: \$ 5 ' 6) (/ / 2 : 6 + , 3 6 \$ 1 ' * 5 \$ 1 7 6

/ H D U Q L Q J (Q U L F K P H & Q W Y H D Q M W \ R I 7 D P S D

Z D D 5 P R E H U P W C / € P 3 P Q D @ W A] P D P Q D @ H P R S U L P Q L Y H D O C O R L Z W H D V S L F W K \ R I & K L F D J R

9 R O N V Z D J H Q) R X Q G D W I 8 R Q Q Y: R U W W R S I * Y W D H Q V E X U J

& 21) (5 (1 & (35 (6 (17 \$ 7 , 25 \$ 1 ' 25 * \$ 1 , = , 1 *

³ 6 HQVRU \ 2 YH UORDG % RGLO \ (PSLULFLVP 11 Q V5 KRGQDQSK) LVK
 & RQIHUHWQSRHSXODU & XOWXUH \$ VVRFLDWLRQ 6 DQ \$ QWRQL

³ 7 UHPEOLQJ 1 HWZRUVN RUD 6 RFLRORZJKHR 4 XHHWQLQJ WLQH : 6 L
) OHF& 5 HFRQVWUXFWLRQV & RUDO * DEOHV) ORULGD

³) RUHQVLF) ODZTH P KRGQRLORJID QDO . QRZOHGJH LQ 5 XGROS K) L
 \$ PHULFDQ /LWHUD&RQHQUH U\$10/ QHFLB JWL R&DOLIRUQLD 0D \
 GXH WR & 29 , '

³ μ \$ QHVWKHVLD : RXOG % H . LQGHU ¶ \$ QHVWKHVLD DQG) HPLC
 * LRDQH WUOD & G L WL VK \$ VVRFLDWLRQ IRU 0 RQGHWUHQFHW 6 WX
 7 URXEOLQJ 0 RRGHURQQLV & QLW HG . LQJGRP - XQH

& RQYHQWQXDO & RQIHUHQFH RQ WKH 3ROLWLFDO (FRQR
 6 RFLRORJLFDO \$ UHWIRFXWDJW L*RHQPDQ \ \$ SULO

: RUNVKRS 2 UJIDQLQHNLQJUNVKRS RQ (PHUJLUSQ QHVWDODUFK
 & RQIHUHQFH RQ WFKHQ B RQ WFKH\$ PRHWQG D6Q V6/RHFPRORJLFDO
 \$ VVRFLDQHLLREQUJ * HUPDQ \ \$ SULO

3DQHO 2UJDQL]HU ³& KLFDJR 6 RFLRORJ\ DQG /LWHUDU \ 0RG
 & RQYHQWLRQ & KLFDJR , OOLQRLV - DQXDU \

³) URPWRS LDV WR 1 DWXUDOLVP 5 HFRYWKUDQJ5 W KHWUWR B IDRUONRQ
 , OOHJLEOH ' 0RGHUQ /DQJXDJH \$ VVRFLDWLRQ & RQYHQWL

³ μ \$ IIHF WLRQ DWHT 9 HUVXV μ ' \ QDPLWLF ¶ - DQH \$ GGD PV DQG
 / RXLVYLOOH & RQIHUHQFH RQ /LWHUDWXUH DQG U & XDUW XUH

³ ' HYLO LQ WKH ' HWDLQV , QWHUSUHWLYH (WKQRJUDSK\ LQ
 + RXVH ¶ / RXLVYLOOH & RQIHUHQFH RQ /LWHUDWXUH DQG
) HEUXDU \

³ μ 1 R (GXFDWRU WR & RPSDUH: HZQ OVK 5 WHYHL H ZJW\$ VVWHTL / GDQH UDWX
 & RPSDUDWLYH / LWHUDWXUH \$ WWRIFLKW L1RHO \$ Q Q DQ G H H W

³ μ ' UDW 6 WDWL VVWLFV ¶) URP 6 WDWL VWKIRV4 XHRV WURP FOKHQFL
) OHF\$ PHULFDQ & RWBDDWU YH\$ MLRFLDWLRQ \$ Q Q XDO 0 HH
 0 DVDFKXVHWWV 0 DUFK

³ 3 XE Q\$ EULWHG - DQH \$ GGD PV ¶ V 0RGHUQLVW 6 RFLRORJ\ ' 0
 & RQYHQWLRQ \$ XVWLQ 7 H [DV - DQXDU \

& O D

3 R S X O D U & X O W X U H \$ V V R F L D W L R Q

7 K H 6 R F L H W \ I R U W K H W 6 K V Q L G \ / R W H W K D I W O X L D H W R I W K H 8 Q L W H G 6

/ \$ 1 * 8 \$ * (6

) U H Q E K D G L Q J N Q R Z O H G J H

* H U P D Q H D G L Q J N Q R Z O H G J H

6 S D Q L V K N U Q H R D Z G I H Q J J H

5 ()(5(1&(6

\$ Y D L O D E O H X S R Q U H T X H V W