Aeq, Beq

for function mpc_mat design

$$x(1|k) = Ax(0|k) + Bu(0|k)$$
$$x(2|k) = Ax(1|k) + Bu(1|k)$$
$$x(3|k) = Ax(2|k) + Bu(2|k)$$
$$\vdots$$
$$x(N-1|k) = Ax(N-2|k) + Bu(N-2|k)$$
$$x(N|k) = Ax(N-1|k) + Bu(N-1|k)$$

$\dim(x(i|k)) = n \times 1$

$\dim(u(i|k)) = p \times 1$

$$Ax(0|k) - x(1|k) + Bu(0|k) = 0 \qquad \dim(A) = n \times n$$
$$Ax(1|k) - x(2|k) + Bu(1|k) = 0 \qquad \dim(B) = n \times p$$
$$\vdots$$
$$Ax(N-1|k) - x(N|k) + Bu(N-1|k) = 0$$

$$\begin{bmatrix} A & -I & 0 & 0 & \cdots & 0 & 0 \\ 0 & A & -I & 0 & \cdots & 0 & 0 \\ 0 & 0 & A & -I & \cdots & 0 & 0 \\ \vdots & \vdots & \vdots & \vdots & \ddots & \vdots & \vdots \\ 0 & 0 & 0 & 0 & \cdots & A & -I \end{bmatrix}_{N \cdot n \times (N+1)n} \quad \begin{bmatrix} B & 0 & 0 & \cdots & 0 \\ 0 & B & 0 & \cdots & 0 \\ 0 & 0 & B & \cdots & 0 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & 0 & \cdots & B \end{bmatrix}_{N \cdot n \times N \cdot p}$$

$$\begin{pmatrix} 0 & 0 & 0 & 0 & \cdots & 0 & +I \\ +I & 0 & 0 & 0 & \cdots & 0 & 0 \end{pmatrix}_{2n \times (N+1)n} \quad \begin{matrix} 0 \\ 0 \end{matrix} \quad \begin{matrix} 0 & 0 & \cdots & 0 \\ 0 & 0 & \cdots & 0 \end{matrix}$$

$Z(k) = x(N|k) = 0$

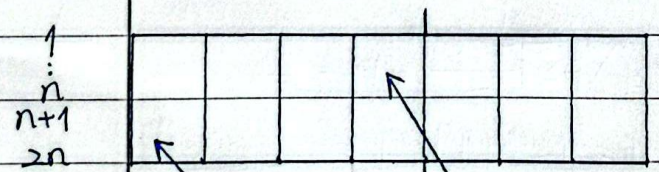
$Z(k) = x(0|k) = 0$

	1:n	n+1:2n						
i=1	1:n	A	-I	0	0	B	0	0
i=2	n+1:2n	0	A	-I	0	0	B	0
⋮		0	0	A	-I	0	0	B
i=N								

kron(eye(N), B)

row: $((i-1)n+1) : i \cdot n$
col: $((i-1)n+1) : i \cdot n$ } for: A

row: $((i-1)n+1) : i \cdot n$
col: $(i-1)n+1+n : i \cdot n+n = i \cdot n+1 : (i+1)n$ } for: -I



$(1:n)$

$Nn+1 : (N+1)n$ for: col

Beq:

$(N+2) \cdot n$

$N \cdot n+n+1 : (N+2)n$

$\Rightarrow (N+1)n+1 : (N+2)n$