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## HIGHWAY STANDARDS

|    | HIGHWAY      | STANDARDS   |
|----|--------------|---|
|    | 000001-06    | STANDARD SYMBOLS, ABBREVIATIONS AND PATTERNS  |
|    | 001001-02    | AREAS OF REINFORCEMENT BARS   |
|    | 280001-07    | TEMPORARY EROSION CONTROL SYSTEMS   |
|    | 420001-08    | PAVEMENT JOINTS   |
|    | 424001-08    | PERPENDICULAR CURB RAMPS FOR SIDEWALKS  |
|    | 442201-03    | CLASS C AND D PATCHES   |
|    | 542001-04    | CONCRETE END SECTIONS FOR PIPE CULVERTS 15" (375 MM)                                    |
|    | 342001 04    | THRU 84" (2100 MM) DIAMETER COLVERTS IS (375 MM)  |
|    | 542006-01    | MULTIPLE CONCRETE END SECTIONS FOR PIPE CULVERTS  |
|    | 342000 01    | 15" (376MM) THRU 84" (2100 MM) DIAMETER   |
|    | 542311-05    | TRAVERSABLE PIPE GRATE  |
|    | 601101-01    | CONCRETE HEADWALL FOR PIPE DRAIN  |
|    | 602301-04    | INLET, TYPE A   |
|    | 602411-04    | MANHOLE, TYPE A, 7' (2.1 M) DIAMETER  |
|    | 602601-03    | PRECAST REINFORCED CONCRETE FLAT SLAB TOP   |
|    | 602701-02    | MANHOLE STEPS   |
|    | 604001-04    | FRAME AND LIDS, TYPE 1  |
|    | 604036-03    | GRATE. TYPE 8   |
|    |              |   |
|    | 635006-03    | CONCRETE CURB TYPE B AND COMBINATION CONCRETE CURB AND CUTTER                           |
|    | 635011-02    | REFLECTOR AND TERMINAL MARKER PLACEMENT   |
|    |              | REFLECTOR MARKER AND MOUNTING DETAILS   |
|    | 664001-02    | CHAIN LINK FENCE  |
|    | 701101-04    | OFF-RD OPERATIONS. MULTILANE 15' (4.5 m) TO 24" (600 mm) FROM PAVEMENT EDGE             |
|    | 701106-02    | OFF-RD OPERATIONS, MULTILANE MORE THAN 15' (4,5 m) AWAY                                 |
|    | 701400-08    | APPROACH TO LANE CLOSURE, FREEWAY/EXPRESSWAY  |
|    | 701401-09    | LANE CLOSURE, FREEWAY/EXPRESSWAY  |
|    | 701402-10    | LANE CLOSURE, FREEWAY/EXPRESSWAY, WITH BARRIER  |
|    | 701406-09    | LANE CLOSURE, FREEWAY/EXPRESSWAY, DAY OPERATIONS ONLY                                   |
|    | 701411-09    | LANE CLOSURE, MULTILANE, AT ENTRANCE OR EXIT RAMP, FOR SPEEDS > 45 MPH                  |
| Λ  | 701428       | TRAFFIC CONTROL, SETUP AND REMOVAL, FREEWAY/EXPRESSWAY                                  |
| ۱, | 701456-03    | PARTIAL EXIT RAMP CLOSURE FREEWAY/EXPRESSWAY  |
| *  | 103730-03    | PARTIAL EXIT RAME CLOSURE FREEWATZEAFRESSWAT  |
|    | 701611       | URBAN HALF ROAD CLOSURE, MULTILANE, 2W WITH MOUNTABLE MEDIAN                            |
|    | 701801-05    | LANE CLOSURE, MULTILANE 1W OR 2W CROSSWALK OR SIDEWALK CLOSURE                          |
|    | 701901-04    | TRAFFIC CONTROL DEVICES   |
|    | 704001-07    | TEMPORARY CONCRETE BARRIER  |
|    | 720001-01    | SIGN PANEL MOUNTING DETAILS   |
|    | 720011-01    | METAL POSTS FOR SIGNS, MARKERS AND DELINEATORS  |
|    | 728001-01    | TELESCOPING STEEL SIGN SUPPORT  |
|    | 729001-01    | APPLICATIONS OF TYPES A AND B METAL POSTS (FOR SIGNS & MARKERS)                         |
|    | 814001-03    | HANDHOLES   |
|    | 814006-02    | DOUBLE HANDHOLES  |
|    | 878001-10    | CONCRETE FOUNDATION DETAILS   |
|    |              | PCC PAVEMENT SPECIAL (NONREINFORCED)  |
|    | B.L.R. 22-07 | TYPICAL APPLICATION OF TRAFFIC CONTROL DEVICES FOR CONSTRUCTION ON RURAL LOCAL HIGHWAYS |
|    | • '          | The second sections for sometimes of hundre book monars                                 |
|    |              |   |

1 REV . 4/9/15

SCALE: NONE

|   | KLINGNER                           |   |
|---|------------------------------------|---|
|   | & ASSOCIATES, P.C.                 | ŀ |
| ı | Engineers · Architects · Surveyors | ŀ |

| USER NAME : ##b            | DESIGNED - SEB | REVISED - seb - 4/9/15 |
|----------------------------|----------------|------------------------|
|                            | DRAWN - SEB    | REVISED -              |
| PLOT SCALE * 0.1667 1/ 15. | CHECKED -      | REVISED -              |
| PLOT DATE * 4/9/2015       | DATE -         | REVISEO -              |

| STATE      | OF | ILLINOIS       |
|------------|----|----------------|
| DEPARTMENT | OF | TRANSPORTATION |

|                                    | · · · · · · · · · · · · · · · · · · · | I F.A.I. |                 |           | TAYAL  | SHEE |
|------------------------------------|---------------------------------------|----------|-----------------|-----------|--------|------|
| NDEX OF SHEETS & HIGHWAY STANDARI  | OS                                    | RTE.     | SECTION         | COUNTY    | SHEETS | NO.  |
| MISSOURI AVENUE DEEP WELL FACILITY |                                       | 55/70/64 | 82-4T-1         | ST. CLAIR | 185    | 2    |
|                                    |                                       |          |                 | CONTRACT  | NO. 7  | 6G99 |
| SHEET 1 OF 1 SHEETS STA.           | TO STA.                               | 1        | THE INDISPERSOR | D PRO ECT |        |      |

| CHANCEABLE MESSAGE SIGN   CAL MO   MOBILIZATION   CAL MO   MOBILIZATION   CAL MO   CAL MO  |           |   |  |   |      |     | CONSTRUCTION CODE | E  |     |
|---|-----------|---|--|---|------|-----|-------------------|--|-----|
| MON-SPECIAL WASTE DISPOSAL  |           |   |  | URBAN<br>100% STATE   | 0040 |     |                   |  |     |
|   |           | ITEM  | —————————————————————————————————————— |   |      |     |                   | 4544   |     |
|   |           |   |  |   |      |     |                   |  |     |
| EACH   3   3   3   3   3   3   3   3   3  | 66900200  | NON-SPECIAL WASTE DISPOSAL  | CU YD                                  | 9500  | 9500 |     |                   |  |     |
| CAL MO   30   30   30   30   30   30   30   3   | 66900450  | SPECIAL WASTE PLANS AND REPORTS   | L SUM                                  | t to the state of | 1    |     |                   |  |     |
|   |           |   |  |   |      |     |                   |  |     |
| 10100205   TRAFFIC CONTROL AND PROTECTION, STANDARD 7014D1   EACH   1   1   1   1   1   1   1   1   1   | 66900530  | SOIL DISPOSAL ANALYSIS  | EACH                                   | 3   | 3    |     |                   |  |     |
| 10100205   TRAFFIC CONTROL AND PROTECTION, STANDARD 701401   EACH   1   1   1   1   1   1   1   1   1   | 67000400  | ENGINEER'S FIELD OFFICE, TYPE A   | CAL MO                                 | 30  | 30   |     |                   | -  |     |
| 170100420   TRAFFIC CONTROL AND PROTECTION, STANDARD TO1411   EACH   1   1   1   1   1   1   1   1   1  | 67100100  | MOBILIZATION  | L SUM                                  | t e   | 1    |     |                   |  |     |
| TO100420   TRAFFIC CONTROL AND PROTECTION, STANDARD TO1411   EACH   1   1   | 70100205  | TRAFFIC CONTROL AND PROTECTION, STANDARD 701401                         | EACH                                   | 1   | 1    |     |                   | and the second s |     |
| ### ##################################  |           |   |  |   |      |     |                   |  | · · |
| 70103815 TRAFFIC CONTROL SURVEILLANCE CAL DA 120 120 120 120 120 120 120 120 120 120  | 70100420  | TRAFFIC CONTROL AND PROTECTION, STANDARD 701411                         | EACH                                   | 1   | 1    |     |                   |  |     |
| TO103815 TRAFFIC CONTROL SURVEILLANCE CAL DA 120 120 120 120 120 120 120 120 120 120  | 70100825  |   | L SUM                                  | 1   | 1    | ) A |                   |  |     |
| 70301000 WORK ZONE PAVEMENT MARKING REMOVAL  SO FT 1416 1416  TO400100 TEMPORARY CONCRETE BARRIER  FOOT 554 554  TO600260 IMPACT ATTENUATORS, TEMPORARY (FULLY REDIRECTIVE, NARROW), TEST LEVEL 3 EACH 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  | 70103815  |   | CAL DA                                 | 120   | 120  |     |                   |  |     |
| T0400100 TEMPORARY CONCRETE BARRIER F00T 554 554  | 70106800  | CHANGEABLE MESSAGE SIGN   | CAL MO                                 | 16  | 16   |     |                   | **************************************   |     |
| TOGODZGO IMPACT ATTENUATORS, TEMPORARY (FULLY REDIRECTIVE. NARROW), TEST LEVEL 3 EACH 1 1 1 1   | 70301000  | WORK ZONE PAVEMENT MARKING REMOVAL                                      | SO FT                                  | 1416  | 1416 |     |                   | 100 mm m m m m m m m m m m m m m m m m m   |     |
| 70600260 IMPACT ATTENUATORS, TEMPORARY (FULLY REDIRECTIVE, NARROW), TEST LEVEL 3 EACH 1 1 1 1   | 70400100  | TEMPORARY CONCRETE RAPRIED  | FOOT                                   | 554   | 554  |     |                   |  |     |
| TROOPOO4   MODIFIED URETHANE PAVEMENT MARKING - LINE 4"   FOOT   1050 | 10-100100 | THE OWNER TO DAILBIEN   |  | JJ7   |      |     |                   |  |     |
|   | 70600260  | IMPACT ATTENUATORS, TEMPORARY (FULLY REDIRECTIVE, NARROW), TEST LEVEL 3 | EACH                                   | 1   | 1    |     |                   | TO THE PARTY OF TH |     |
| 78009005 MODIFIED URETHANE PAVEMENT MARKING - LINE 5" FOOT 488 488  | 78009004  | MODIFIED URETHANE PAVEMENT MARKING - LINE 4"                            | FOOT                                   | 1050  | 1050 |     |                   |  |     |
|   | 78009005  | MODIFIED URETHANE PAVEMENT MARKING - LINE 5"                            | FOOT                                   | 488   | 488  |     |                   |  |     |

USER NAME : bg.

A ASSOCIATES, P.C.
Engineers · Architects · Surveyors

PLOT SCALE · 48,8000 · / In.

Engineers · Architects · Surveyors

PLOT DATE · 1/13/2015

USER NAME = 593 DESIGNED - 860 REVISED 
DRAWN - 560 REVISED 
PLOT SCALE + 40,0000 '/ in. CHECKED 
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

SUMMARY OF QUANTITIES

MISSOURI AVENUE DEEP WELL FACILITY

CALE: NONE SHEET 6 OF 10 SHEETS STA. TO

F.A.J. SECTION COUNTY TOTAL SHEET NO. 55/70/64 82-47/1 ST. CLAIR 185 9

CONTRACT NO. 76699

a. Pumps:

1) CW-P01, CW-P02, CW-P03, and CW-P04
b. Variable Frequency Drives:
1) CW-VFD01, CW-VFD02, CW-VFD03, end CW-VFD04

Motor Winding Temperature Switches:
 CW-TS01, CW-TS02, CW-TS03, and CW-TS04

d. Solenoid Valves:

1) CW-SV01, CW-SV02, CW-SV03, and CW-SV04 e. Flow Meters:
1) CW-FM01, CW-FM02, CW-FM03, and CW-FM04

f. Control Panels: 1) CW-SP01, CW-CP01. g. Level Sensors: 1) CW-PT01, CW-PT02

Control Logic:
 a. Collector Well Pumps

 When LOCAL mode is selected at VFD operator interface, the operator can manually control the pumps via the VFD operator interface.

2) When REMOTE mode is selected at VFD operator interface, the pumps are controlled manually via

the SCADA system. SCADA system shall allow for manual operation only. No automatic control is required.

3) Activation of the motor winding temperature switch shall prevent operation of the pump in both

LOCAL and REMOTE mode,

4) Verified closure of an auxiliary contact on the local safety disconnect for each pump shall be required.

to enable VFD operation. Auxiliary contact shall be intertocked with phase conductor contacts and shall be of the break-before-break style.

5) Pumps shall be accelerated to the desired pump speed in (2) steps. The first step shall be from 0-30 Hz and the second step shall be 30 Hz to desired pump speed. The remp up time for each step shall be set in the field based on field observations of ramp up times that do not result in water hammer within the police person. within the piping system.

6) Pump deceleration time from running speed to 0 Hz shall be 60 seconds. This number shall be

adjusted in the field as necessary to eliminate water hammer b. Seal Water Sciencid Valves

1) Seal water sciencid be controlled via SCADA software and shall be open for (30) minutes once every

(24) hours.

2) Seat water sciencid shall be open during pumping operation and for (5) minutes prior to pump operation and for (15) minutes following pump operation. This function shall be provided even in the event of SCADA failure.

1) Pump operation shall be prevented when the seal water flow meter indicates inadequate flow

3, Indication at HMI:

Pump Speed
 VFO in remote
 Pump Failure

d. Pump Running

6. Motor Temperature High

f. Seel Water Fall

c. Seat Water Delay

COLLECTOR WELL PUMPS CONTROL LOOP

VERTICAL WELL PUMPS

1. Major Equipment

a, Pumps:

1) VW-P02, VW-P03, VW-P04, VW-P05,

VW-P06, VW-P06A

Control Legic:
 a. Vertical Well Pumps Nos. 2-6A:
 1) When HAND mode is selected at the

MCC bucket, the operator can gradcontrol the pumps via the "Start-Stop" pushbuttons on the bucket. When AUTO is selected at the MCC bucket, the pumps are controlled in

manually via the HMI software. No automatic operation is provided

a. In Auto b. Pump Running

VERTICAL WELL PUMPS CONTROL LOOP

STORMWATER PUMPS

Pumps:
 1) SW-P01, SW-P02, and SW-P03

b. Variable Frequency Drives:
 1) SW-VFD01, SW-VFD02, and SW-VFD03

Motor Winding Temperature Switches:
 SW-TS01, SW-TS02, and SW-TS03

d. Solenoid Valves:
1) SW-SV01, SW-SV02, and SW-SV03

e. Flow Meters:
1) SW-FM01, SW-FM02, and SW-FM03

f. Float Switches:

SW-LS03, SW-LS04, SW-LS05, SW-LS06, SW-LS07

1) CW-SP01, SW-CP01, AND SW-CP02

Control Logic:
 Stormwater Pumps Nos. 1-3; SW-P01, SW-P02, and SW-P03
 When LOCAL mode is selected at VFD operator interface, the operator can manually control the pumps via the VFD operator interface.

When REMOTE mode is selected at VFD operator interface, the pumps are controlled in accordance with HMI software MANUAL/AUTOMATIC selection function as follows:

I. MANUAL- Pump is controlled by the remote operator via the SCADA software in accordance with the HMI selector switch On/Off function

II. In AUTOMATIC the pump is controlled by the SCADA software as follows: 1. Rising Wetwell Water Level:

-SW-LS05 Start Lead Pump -SW-LS06 Start First Leg Pump

-SW-LS07 Start Second Lag Pump

Falling Wetwell Water Level:
 -SW-LS06 Stop First Pump On this cycle

-SW-LS05 Stop Second Pump On this cycle

-SW-LS04 Stop Last Pump On this cycle iii. SCADA software shall include;

-Automatic atternation of lead, lag, and second lag pumps after each pumping cycle -Pump start delay timers to prevent more than one pump starting concurrently after a power outage

parties outage -if a pump is called to operate and does not generate a pump running signal within (7) minutes, the pump shall be removed from service and a pump failure atarm shall be initiated at on the Hild. The next pump in the alternator sequence shall be started in its

3) Activating of the motor winding temperature switch shall prevent operation of the pump in all operation

4) Verified closure of an auxiliary contact on the local eatety disconnect for each pump shall be required to enable VFD operation. Auxiliary contact shall be interlocked with phase conductor contacts and shall be of the break-before-break style.

5) VFD shall operate pump at preset speed (60 Hz).

b. Seal Water Sciencid Valves

1) Seal water solenoid be controlled via SCADA software and shall be open for (30) minutes once every

2) Seel water sciencid shall be open when water level is above SWJ 503

3) Seal water sciencid shall be open during pumping operation and for (5) minutes prior to pump operation and for (15) minutes following pump operation. This function shall be provided even in the event of SCADA feiture.

Seal Water Flow Meters
 Pump operation shall be prevented when the seal water flow meter indicates inadequate flow.

3. Indication at HMI:

a. Pump Speed

b. VFD in remote

c. Pump Failure d. Pump Running e. Motor Temperature High

. Seal Water Fail

g. Seal Water Delay

h. Float Switch SW-LS01 i. Float Switch SW-LS02 j. Float Switch SW-LS03

Float Switch SW-LS04

Float Switch SW-LS05 m. Float Switch SW-LS06

n Float Switch SWJ 507

STORMWATER PUMPS CONTROL LOOP

A REVISED SHEET 4-10-15

|  |             |                |                 | ı          | ES              |   |
|--|-------------|----------------|-----------------|------------|-----------------|---|
| CONTROL LOOPS                          |             | F.A.L.<br>RTE. | SECTION         | COUNTY     | YOTAL<br>SHEETS | 3 |
| URI AVENUE DEEP WELL FACILITY          | ,           | 55/70/64       | 82-41-1         | ST. CLAIR  | 185             | Γ |
| ······································ | <del></del> |                |                 | CONTRACT   | NO. 7           | 6 |
| OF I SHEETS STA.                       | TO STA.     |                | ILLINOIS FED, A | ID PROJECT |                 | _ |

KLINGNER & ASSOCIATES, P.C. PLOT SCALE . 40.0000 1/ 10 gineers · Architects · Surveyors PLOT DATE · 4/9/2815

USER NAME = seb DESIGNED - JUN SEB-4/9/15 REVISED -DRAWN - JJN REVISED -CHECKED ~ REVISED DATE REVISED

STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION

MISSOL SCALE: AS NOTED SHEET 1 OF 1 SHEETS STA.

SHEET NO. 176 76099 ILLINOIS FED, AID PROJECT

THE CONTROL LOOP DESCRIPTIONS ARE NOT INTENDED TO BE AN INCLUSIVE LISTING OF ALL ELEMENTS AND APPURTENANCES

REQUIRED TO EXECUTE LOOP FUNCTIONS, BUT ARE RATHER

AND OTHER SPECIFICATION SECTION.:

INTENDED TO SUPPLEMENT AND COMPLEMENT THE DRAWINGS