



*Setting the Standard for Automation™*

## **Facility P&ID Drawings *and why you need them!***

Graham Nasby  
City of Guelph Water Services  
Guelph, Ontario, Canada

**ISA Hamilton Members Meeting**  
February 22, 2022 – Hamilton, Ontario, Canada

# About the Speaker

**Graham Nasby, P.Eng., PMP, CAP**  
**Water SCADA & Security Specialist**  
**City of Guelph Environmental Services**



- 10 years in the consulting sector
- Joined Guelph Water Services in 2015
- Secretary, ISA Hamilton Section
- Newsletter Editor, ISA Water/Wastewater Division
- Co-chair of ISA112 SCADA Systems standards committee
- Voting member of ISA101 HMI Design and ISA18 Alarm Management standards committees
- Named Canadian Expert on IEC/SCC-TC65 with Standards Council of Canada
- Active member of American Water Works Association and Water Environment Federation
- Has published over 50 papers and articles on automation topics
- Received ISA “Standards Leader of the Year Award” in 2021
- Received University of Guelph “Mid Career Achievement Award” in 2014
- Contact: [graham.nasby@guelph.ca](mailto:graham.nasby@guelph.ca)

# Presentation Outline



- About Guelph
- Typical Facility Documentation
- Project Drawings
- Problems with “as built” drawings
  
- Facility Drawings
- Guelph Water’s P&IDs & Layout Drawings
- Tour of a Facility P&ID
  
- How we use Drawings
- Drawing Update Workflows
- Maintenance Updates
- Guelph’s Drawing Templates



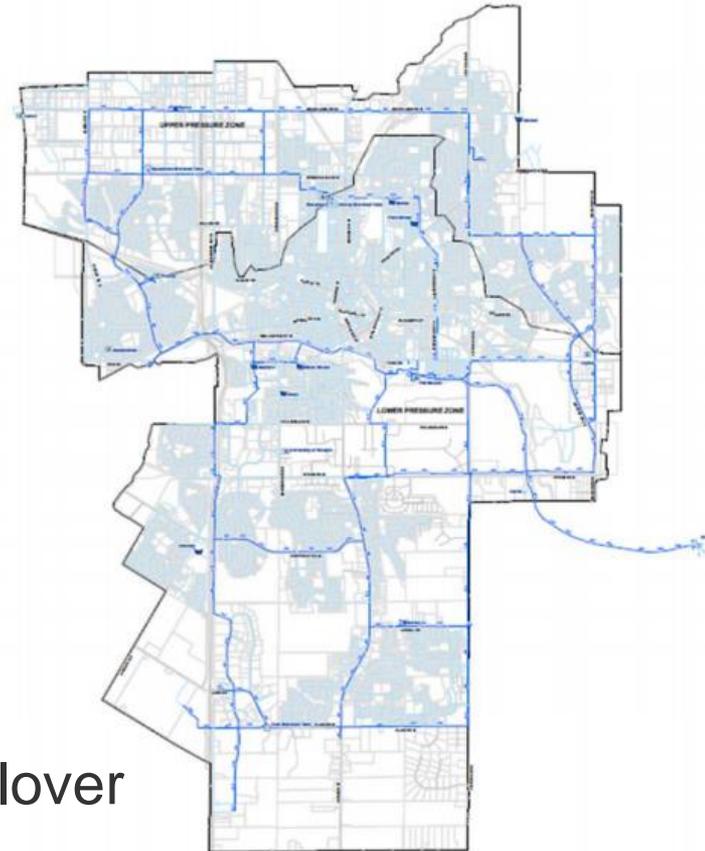
# City of Guelph Water Services

- Guelph, Ontario, Canada
- 140,000 residents
- 21 groundwater wells
- 3 water towers
- 549 km of water mains
- 49,000 service connections
- 2,750 fire hydrants
- 46,000 m<sup>3</sup>/day [12 MGD]



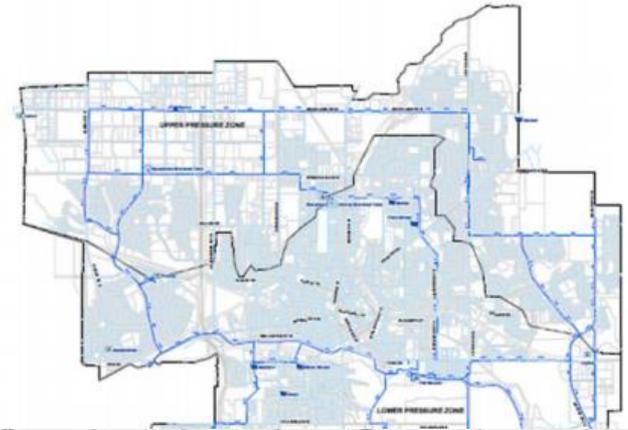
# Guelph Water Facilities

- Approx. 15km x 15km (10mi x 10mi)
- 35 Facilities
  - 4 booster stations
  - 21 wells
  - 2 valve chambers
  - 3 water towers
  - 5 monitoring sites
- High availability SCADA network
  - Primary: private fibre optic
  - Secondary: private wireless, auto-failover
- 40 PLCs plus 2 data centers



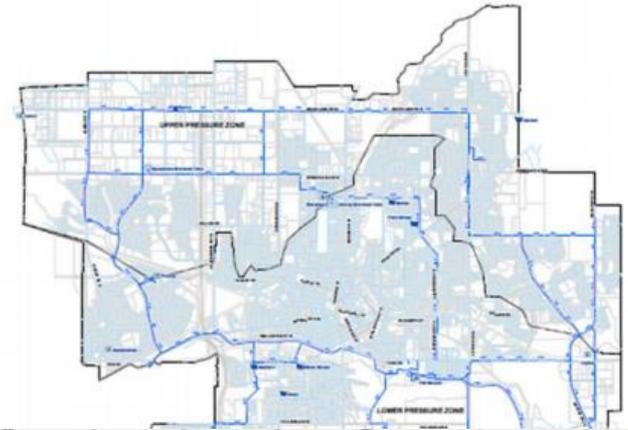
# How do we document a facility?

- P&ID Drawings
- Layout Drawings
- Electrical Drawings
- PLC Panel drawings
- Loop Drawings / Connection Diagrams
- Network Drawings
- Architectural/Civil Drawings
- Structural Drawings
- Mechanical Drawings



# Other Documentation...

- Process Control Narratives (PCN)
- Master Alarm Database
- Instrument Database
- Standard Operating Procedures (SOP)
- Backup copies of software/code
  
- Asset Inventory
- Spare Parts Lists
- Maintenance Procedures
- Equipment Manuals & Documentation
  
- Disinfection Calculation Spreadsheets
- Test Plans / Test Records
- Critical Control Points Documentation
- Site Permits / Licences



# Project Drawings

## “Project Drawings”

- Defines the scope of what the contractor is to do
- Used as a contractual tool
- Defines scope of work
- Defines when work is complete
- Only defines the contractor work

When work is complete, best practice is to issue “as-built” drawings to show what work the contractor actually did



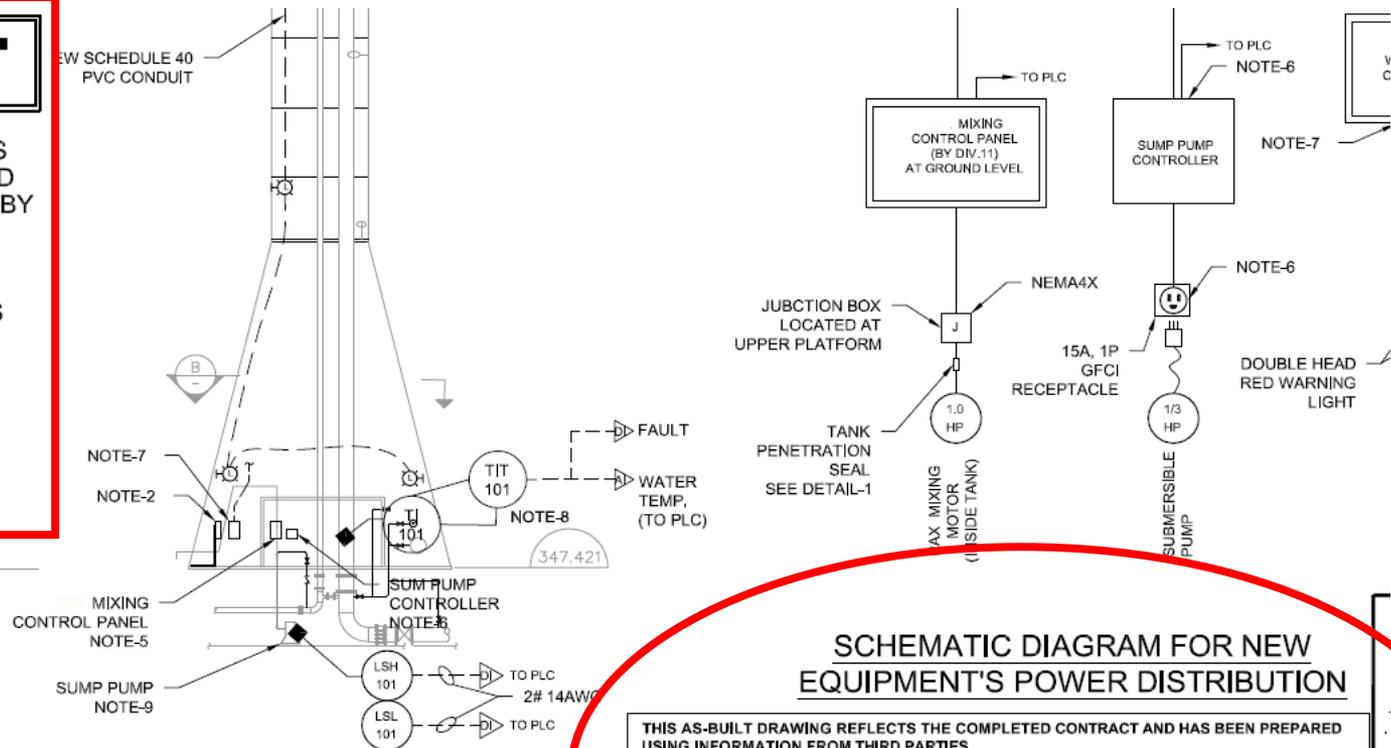




# Problems with As-Built Drawings

## AS-BUILT

THESE AS-BUILT DOCUMENTS HAVE BEEN PREPARED BASED ON INFORMATION PROVIDED BY OTHERS. THE DESIGN PROFESSIONAL HAS NOT VERIFIED THE ACCURACY AND/OR THE COMPLETENESS OF THIS INFORMATION AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT.



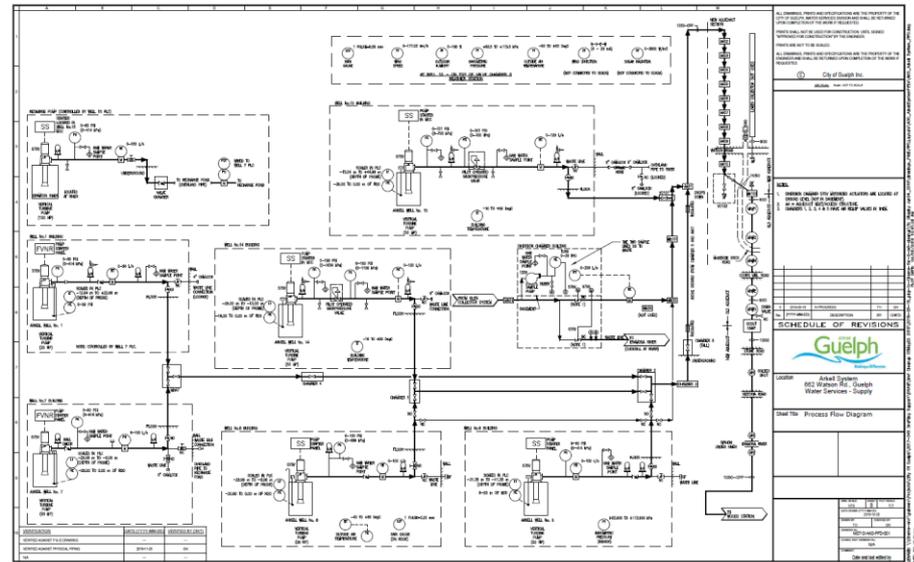
## SCHEMATIC DIAGRAM FOR NEW EQUIPMENT'S POWER DISTRIBUTION

THIS AS-BUILT DRAWING REFLECTS THE COMPLETED CONTRACT AND HAS BEEN PREPARED USING INFORMATION FROM THIRD PARTIES. THE INFORMATION CONTAINED IN THE DRAWING BELONGS TO THE CLIENT, EXCEPT WHERE OTHERWISE COVERED BY WRITTEN AGREEMENT. IT SHALL NOT BE COPIED OR DISTRIBUTED WITHOUT WRITTEN PERMISSION OF RVA. ANY CHANGES MADE OUTSIDE THE CONTRACT, OR AFTER CONTRACT COMPLETION OR THE DATE OF ISSUE MAY NOT BE REFLECTED IN THE DRAWINGS. USERS ARE ADVISED TO TAKE SUFFICIENT STEPS TO FIELD VERIFY EQUIPMENT LAYOUT, LOCATIONS, DIMENSIONS AND ELEVATIONS. THE CLIENT ACCEPTS NO RESPONSIBILITY FOR DAMAGES, IF ANY, SUFFERED BY ANY THIRD PARTY AS A RESULT OF RELIANCE ON, DECISIONS MADE OR ACTIONS BASED ON THIS DRAWING.

**Consultants putting disclaimers on drawings to avoid legal liability is reasonable... But did they bother check if the as-built drawings they are issuing match the site? What if at the end of the project they were already over their hours budget? How much of check would they do?**

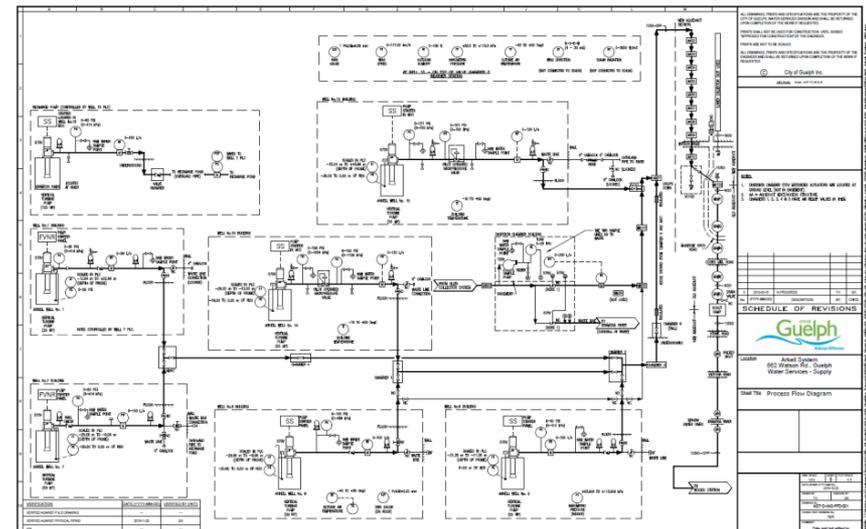
# Facility Drawings

- Maintained as “living documents” to document facilities
- Not associated with construction projects
- Small sub-set of drawings, realizing effort/resources to maintain
- Maintained “in-house”
- Satisfies regulatory requirement for “Up-to-date P&ID Drawings”
- Guelph Water uses:
  - PFDs
  - P&IDs
  - Site Layouts
  - Electrical & I/C Drawings
- Historical “as built” drawings & records from construction projects kept on file for reference



# Facility Drawings

- Maintain a small number of drawings only
- Maintaining drawings takes staff-time/resources
- Do not use any x-refs (external references) in CAD files
- One CAD file per drawing (except for electrical drawings)
- Only use 11"x17" size (8.5x11 is too small, larger sizes hard to print)
- Keep it simple
- Drawings are stored/maintained in house. Standard templates used.
- Engineering firm on retainer for CAD support as needed
- Do not include as deliverable with construction projects (nice drawings are not the focus in a project)



# Facility Drawings: PFDs

- PFDs – Process Flow Diagrams

## Goals

- Show major piping only, summarize/omit secondary lines
- Show all main valves & instrumentation
- Do not include any SCADA I/O or tagging details
- Do not include unnecessary tagging details
- Do not use “layers” to show/hide information (layers get forgotten)
- Include key information such as instrumentation ranges & pump sizes
  
- Quickly summarizes the process
- Useful for regulatory submissions/permits, as well as SOP’s and training
- Easy to read drawing for Inspector visits
- One sheet per site







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City of Guelph

Scale: NOT TO SCALE

|     |              |             |     |        |
|-----|--------------|-------------|-----|--------|
| 0   | 2018-02-21   | IN PROGRESS | TH  | GN     |
| No. | (YYYY-MM-DD) | DESCRIPTION | BY: | CHK'D: |

SCHEDULE OF REVISIONS

**CITY OF Guelph**  
Making a Difference

Location: Water St. Well  
200 Water St., Guelph  
Water Services - Support

Sheet Title: Process Flow Diagram

05May22 2018\05-18 pkg-to-Chernie-for- Plot DATE: 04/

| 10 | VERIFICATION                     | DATE (YYYY-MM-DD) | VERIFIED BY (INIT) |
|----|----------------------------------|-------------------|--------------------|
|    | VERIFIED AGAINST P & ID DRAWING  | 2017-11-07        | GN                 |
|    | VERIFIED AGAINST PHYSICAL PIPING | 2017-11-07        | GN                 |
|    | N/A                              | --                | --                 |

|            |    |            |
|------------|----|------------|
| DATE       | BY | PLOT SCALE |
| 2018-02-21 | GN | 1:1        |
| DATE       | BY | SCALE      |
| 2018-02-21 | GN | 1:1        |
| DATE       | BY | SCALE      |
| 2018-02-21 | GN | 1:1        |
| DATE       | BY | SCALE      |
| 2018-02-21 | GN | 1:1        |
| DATE       | BY | SCALE      |
| 2018-02-21 | GN | 1:1        |

# Facility Drawings: P&IDs

- P&IDs – Piping and Instrumentation Diagrams

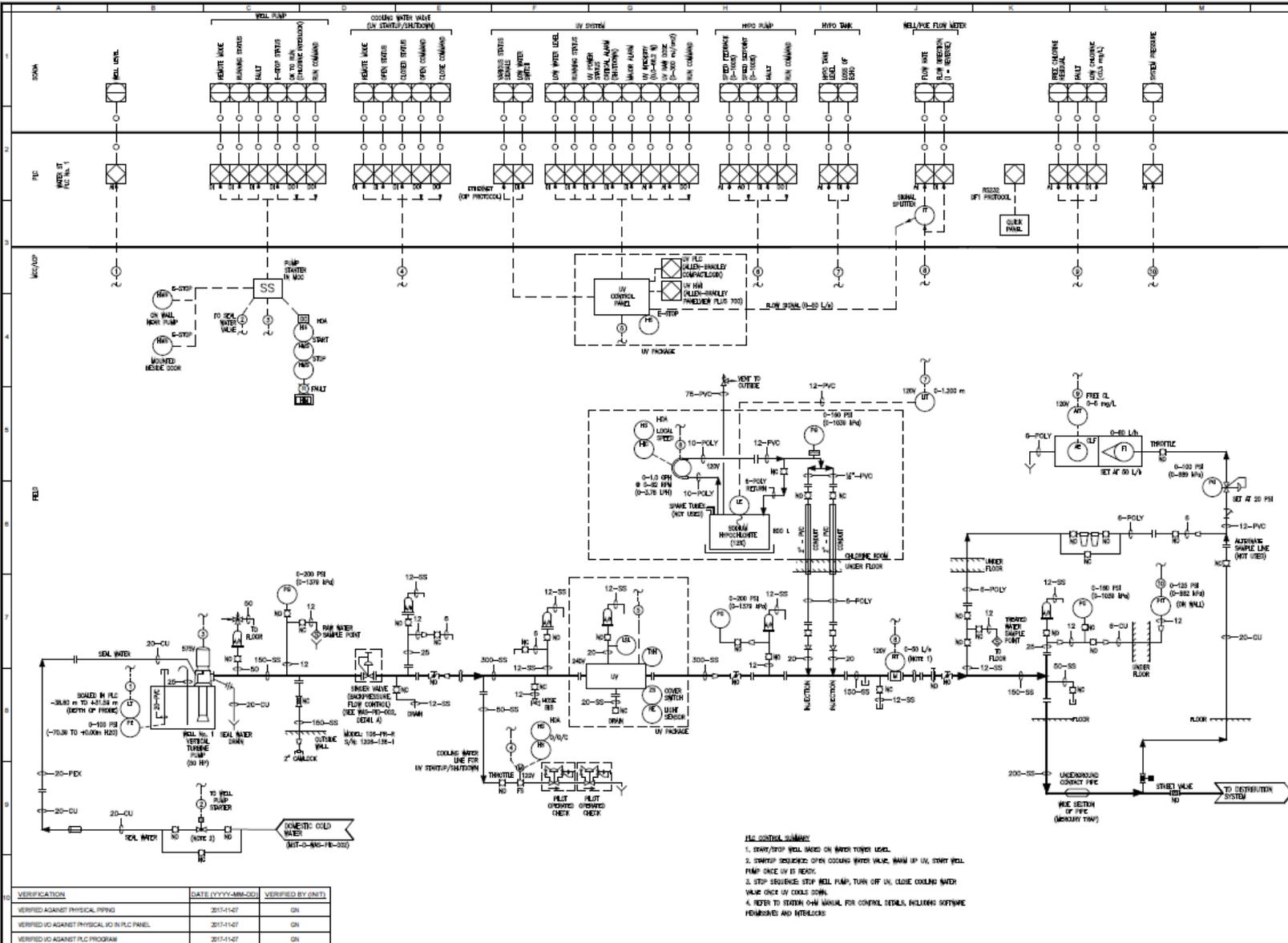
## Goals

- Show all pipes with sizes and materials
- Show all valves, instrumentation, and pumps, including sizes
- Full SCADA I/O Details, and clearly show hard-wired controls
- Shows what I/O is from each device/instrument
- All instrumentation and signals have ranges clearly shown
- Both “native” and (in brackets) converted signal scaling is shown
- Summarize electrical details

## Avoid

- Cryptic SCADA tags for signal names – use plain language
- Specific PLC I/O addresses – these can be found in other drawings
- Software programming details – that information is in the PCN

# Facility Drawings: P&IDs



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City of Guelph  
 DESIGN DRAWING NOT TO SCALE

- NOTES:**
- SCADA USES THIS FLOW METER TO READ BOTH FORWARD (TO DISTRIBUTION) AND REVERSE (COOLING WATER FROM DISTRIBUTION) FLOWS.
  - ON WELL PUMP STARTUP, THE WATER STARTER MUST OPEN SCADA WATER LINE FOR 30 SECONDS TO FILL SHAFT THEN STARTS PUMP. ONCE PUMP STARTED, THE SEAL WATER IS SHUT OFF BY STARTER.

| NO. | DATE       | DESCRIPTION | BY | CHK   |
|-----|------------|-------------|----|-------|
| 1   | 2015-04-16 | IN PROGRESS | TH | DN    |
| 2   | 2017-11-02 |             | SP | DN/CD |

**SCHEDULE OF REVISIONS**



Location: Water St. Well  
 200 Water St., Guelph  
 Water Services - Supply

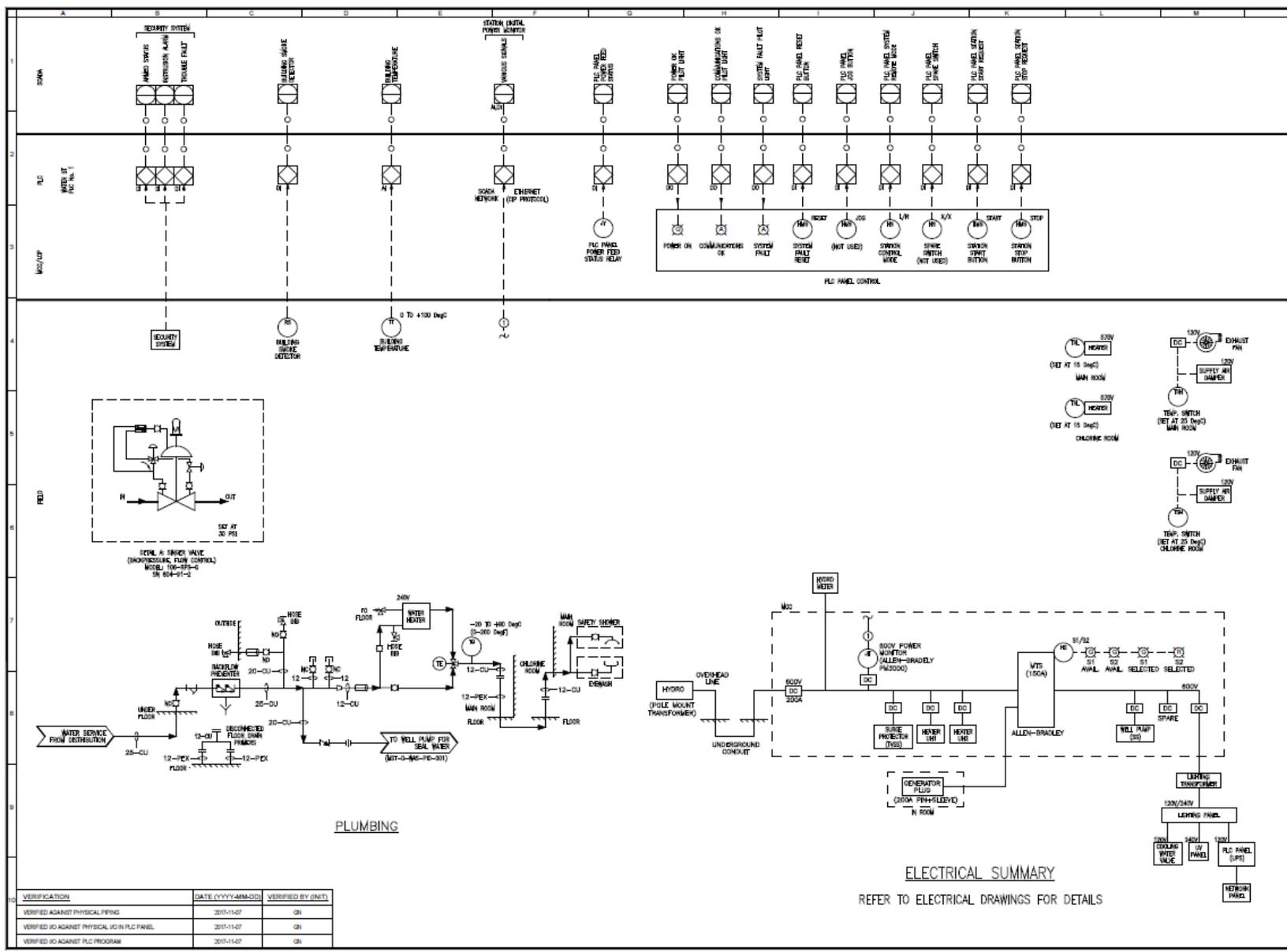
Sheet Title: P&ID (1 of 2)  
 Well + Treatment

|                               |            |         |            |
|-------------------------------|------------|---------|------------|
| REV. NO.                      | DATE       | REV. BY | REV. DATE  |
| 1                             | 2015-04-16 | TH      | 2015-04-16 |
| 2                             | 2017-11-02 | SP      | 2017-11-02 |
| DRAWN BY: [Name]              |            |         |            |
| CHECKED BY: [Name]            |            |         |            |
| PROJECT NO.: MCT-D-WAS-PC-001 |            |         |            |
| CLIENT: [Name]                |            |         |            |
| DATE AND LAST USED BY: [Name] |            |         |            |

- PLC CONTROL SUMMARY:**
- START/STOP WELL BASED ON WATER TOWER LEVEL.
  - STARTER SEQUENCING: OPEN COOLING WATER VALVE, RAMP UP UV, START WELL PUMP, ONCE UV IS READY.
  - STOP SEQUENCING: STOP WELL PUMP, TURN OFF UV, CLOSE COOLING WATER VALVE ONCE UV COOLS DOWN.
  - REFER TO EXISTING O&M MANUAL FOR CONTROL DETAILS, INCLUDING SOFTWARE FIRMWARES AND INTERLOCKS.

| VERIFICATION                               | DATE (YYYY-MM-DD) | VERIFIED BY (INIT) |
|--|-------------------|--------------------|
| VERIFIED AGAINST PHYSICAL PIPING           | 2017-11-02        | DN                 |
| VERIFIED AGAINST PHYSICAL I/O IN PLC PANEL | 2017-11-02        | DN                 |
| VERIFIED AGAINST PLC PROGRAM               | 2017-11-02        | DN                 |

# Facility Drawings: P&IDs



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City of Guelph  
DESIGNED BY: [blank] DRAWN BY: [blank]

NOTES:  
 1. [blank]

| No. | DATE       | DESCRIPTION | BY      | CHKD.   |
|-----|------------|-------------|---------|---------|
| 1   | 2016-04-18 | IN PROGRESS | [blank] | [blank] |

**SCHEDULE OF REVISIONS**

Location: Water St. Well  
 200 Water St., Guelph  
 Water Services - Supply

Sheet Title: P&ID (2 of 2)  
 Building / Utilities

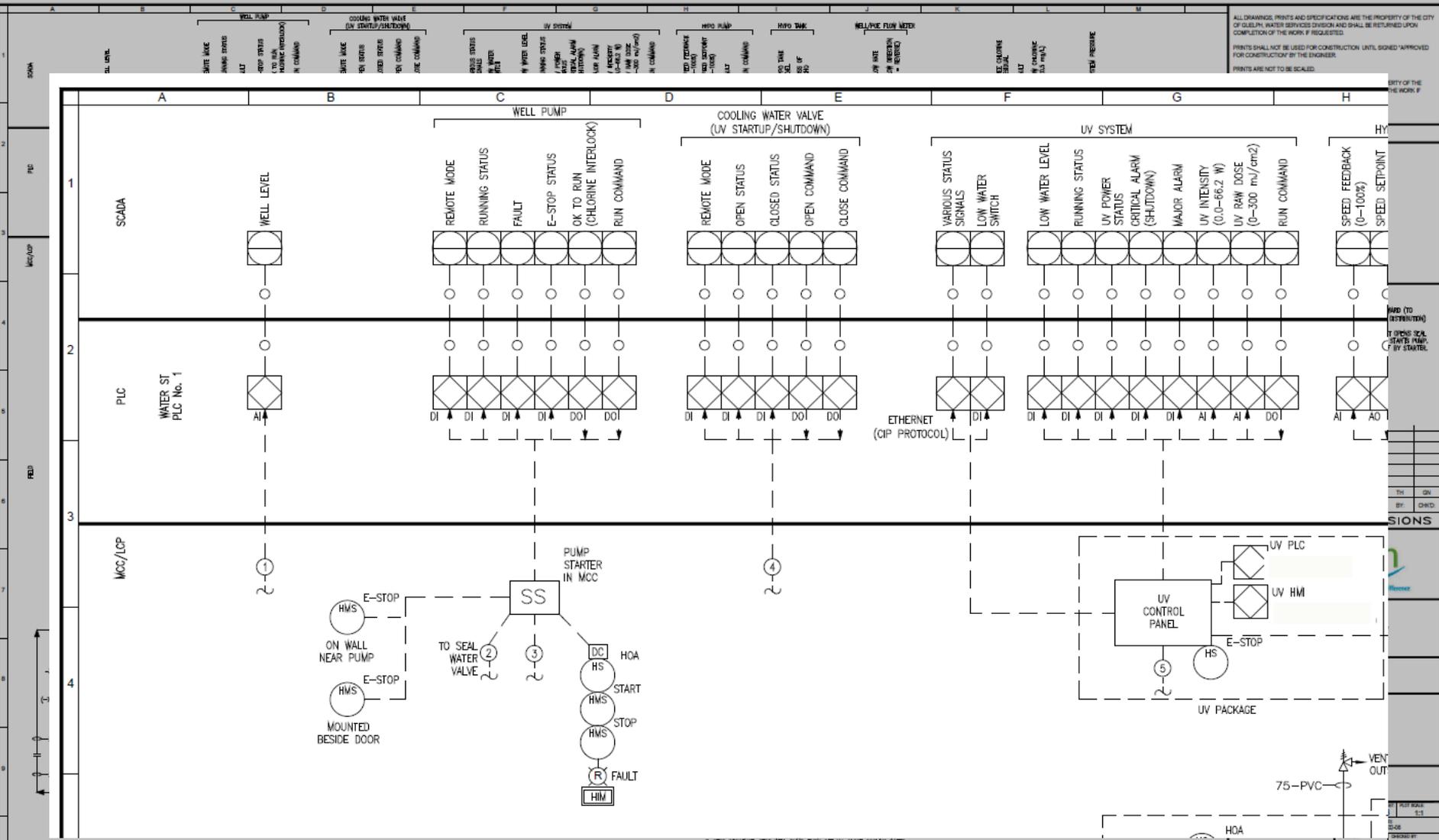
| REV. | DATE       | BY | APP'D. | DESCRIPTION             |
|------|------------|----|--------|-------------------------|
| 1    | 2016-02-08 | IC | TD     | ISSUED FOR CONSTRUCTION |

DATE AND LAST EDITED BY: [blank]

# Facility Drawings: P&IDs



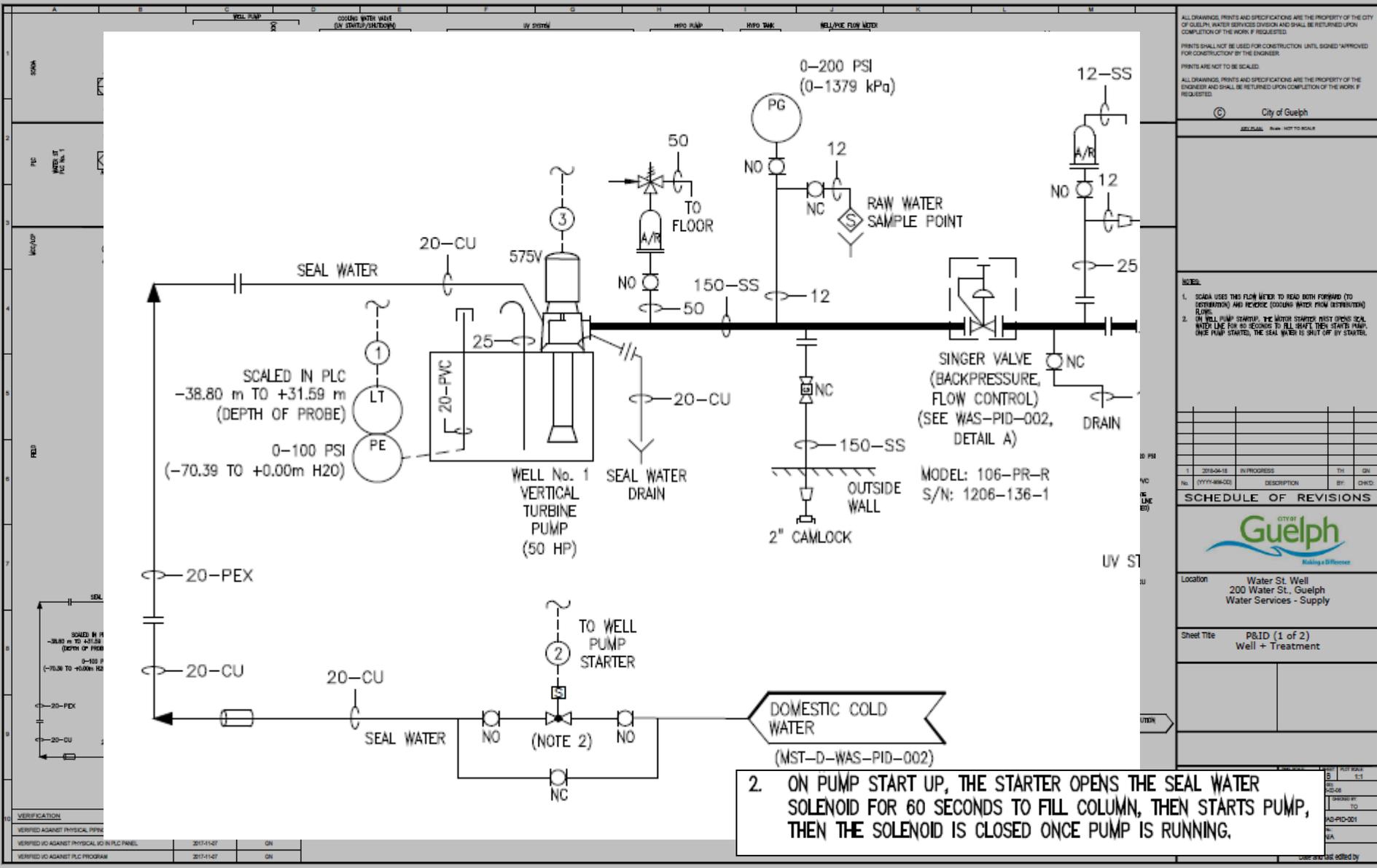
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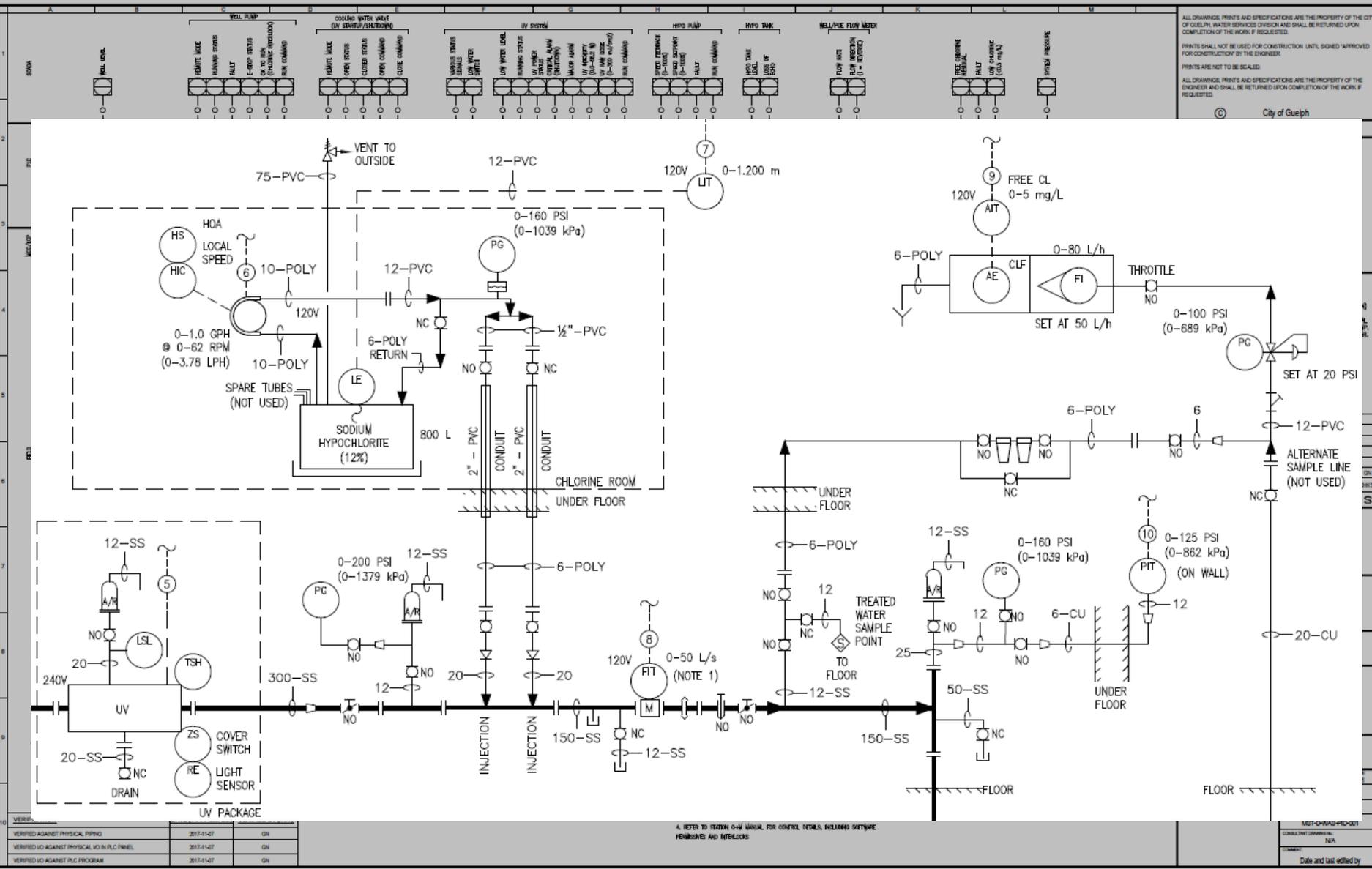
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| VERIFIED I/O AGAINST PHYSICAL I/O IN PLC PANEL | 2017-11-27        | GN                 |
| VERIFIED I/O AGAINST PLC PROGRAM               | 2017-11-27        | GN                 |

3. STOP SEQUENCE STOP WELL PUMP, TURN OFF UV, CLOSE COOLING WATER VALVE ONCE UV COOLS DOWN.  
4. REFER TO STATION O-HV MANUAL FOR CONTROL DETAILS, INCLUDING SOFTWARE PERMISSIONS AND INTERLOCKS.

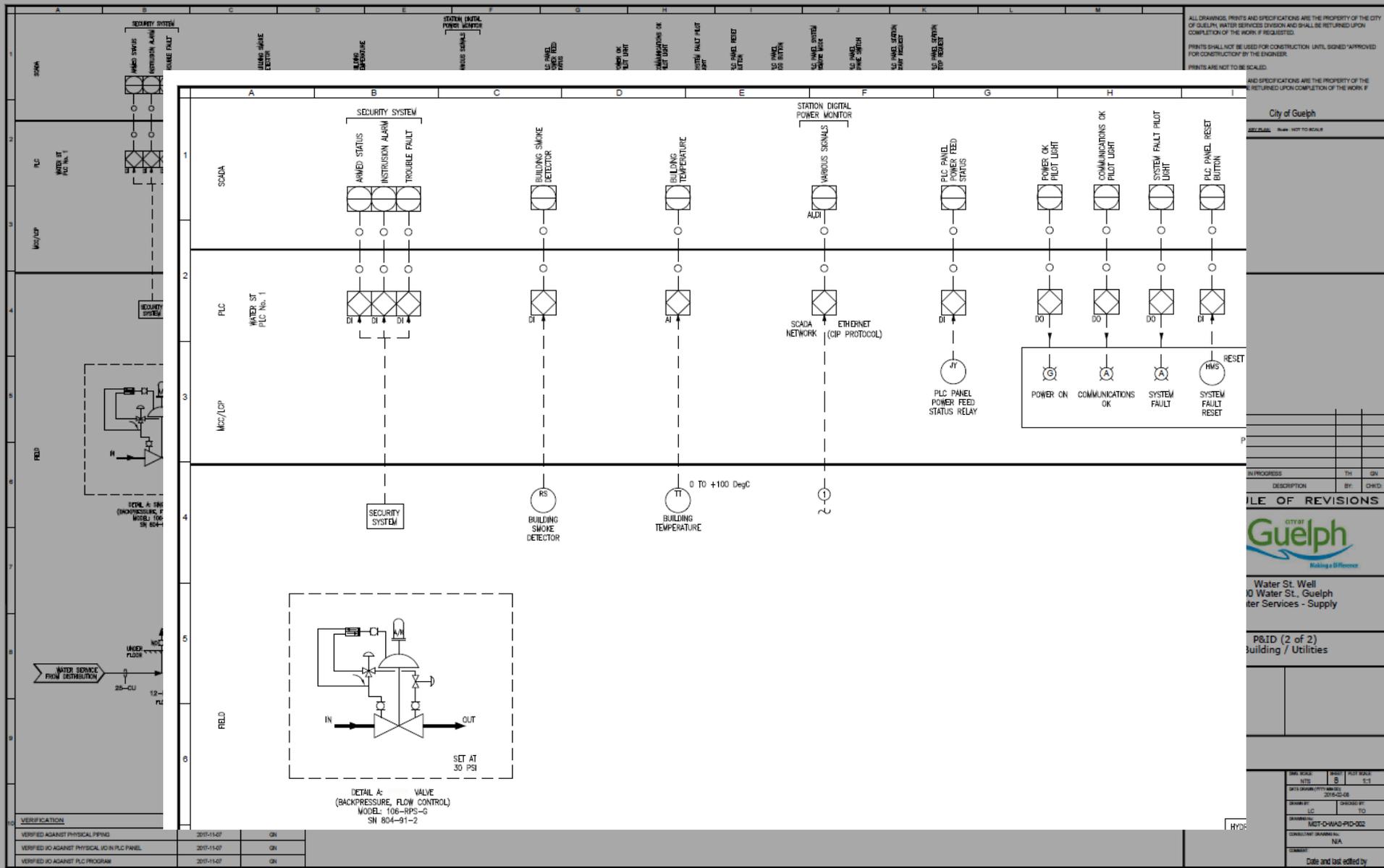
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|-------------------------|------------------|----|------|
| DATE                    | 17               | 11 | 2017 |
| TIME                    | 10:00            | AM |      |
| PROJECT                 | MET-O-HV-PID-021 |    |      |
| DESIGNED BY             | NEA              |    |      |
| CHECKED BY              | NEA              |    |      |
| DATE AND LAST EDITED BY |                  |    |      |



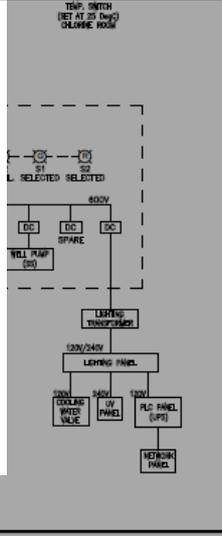
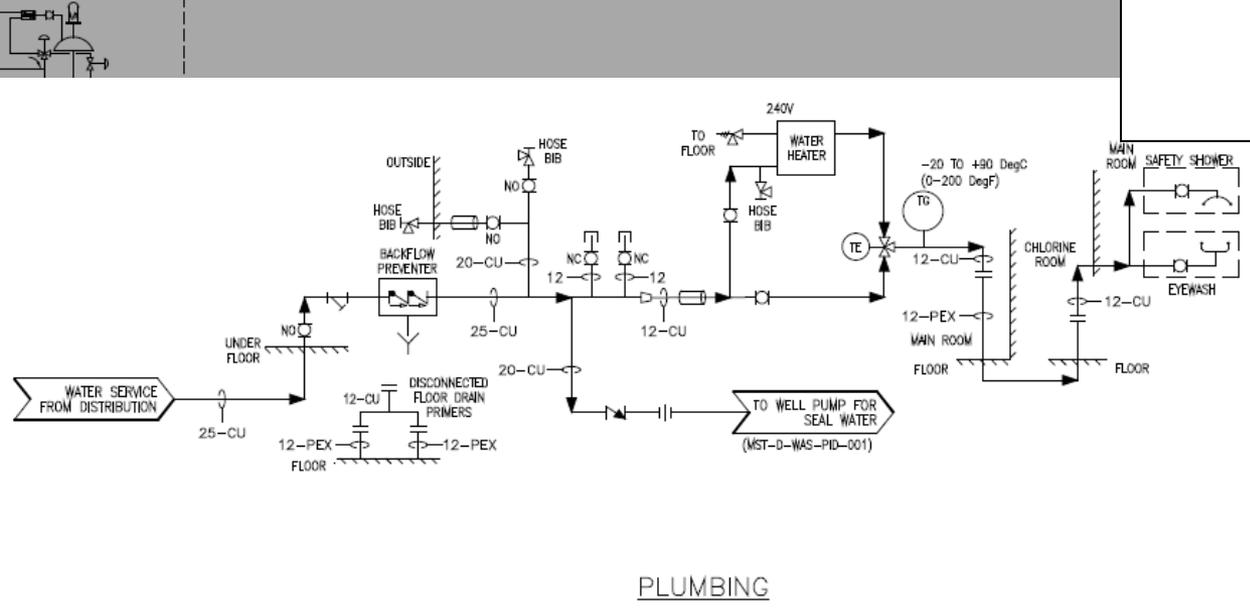
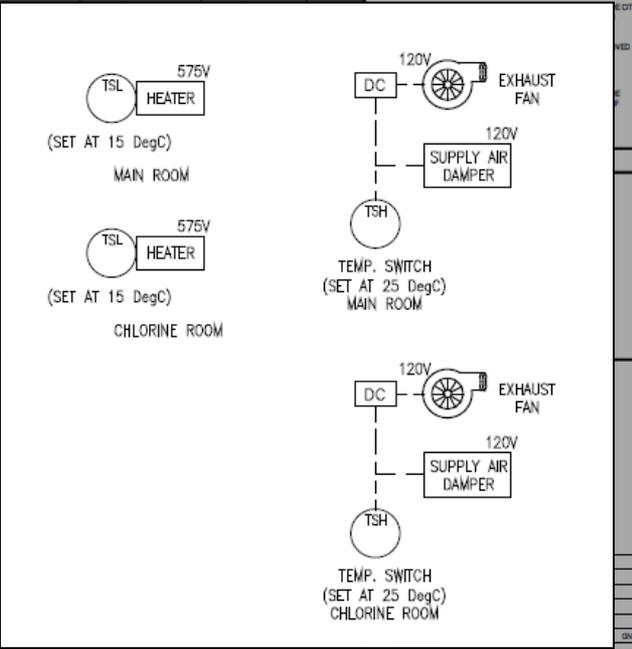
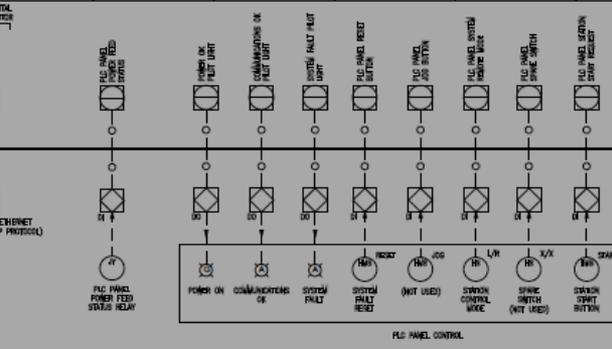
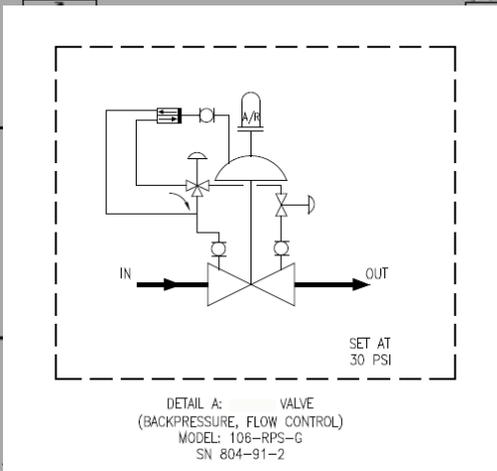
# Facility Drawings: P&IDs



# Facility Drawings: P&IDs



# Facility Drawings: P&IDs



| NO.  | DATE           | DESCRIPTION      | BY         | CHKD. |
|--|----------------|------------------|------------|-------|
| <b>SCHEDULE OF REVISIONS</b>   |                |                  |            |       |
|  |                |                  |            |       |
| Location: Water St. Well<br>200 Water St., Guelph<br>Water Services - Supply |                |                  |            |       |
| Sheet Title: P&ID (2 of 2)<br>Building / Utilities                           |                |                  |            |       |
| DATE: N/A  | SCALE: B       | DATE: 2016-02-02 | SCALE: 1:1 |       |
| DRAWN BY: LC   | CHECKED BY: TO | DATE: 2016-02-02 |            |       |
| PROJECT: MST-D-WAS-PID-002   |                |                  |            |       |
| CONTRACT NUMBER: N/A   |                |                  |            |       |
| Date and last edited by  |                |                  |            |       |

| VERIFICATION                                 | DATE       | STATUS |
|--|------------|--------|
| VERIFIED AGAINST PHYSICAL PIPING             | 2017-11-07 | OK     |
| VERIFIED 3D AGAINST PHYSICAL 3D IN PLC PANEL | 2017-11-07 | OK     |
| VERIFIED 3D AGAINST PLC PROGRAM              | 2017-11-07 | OK     |

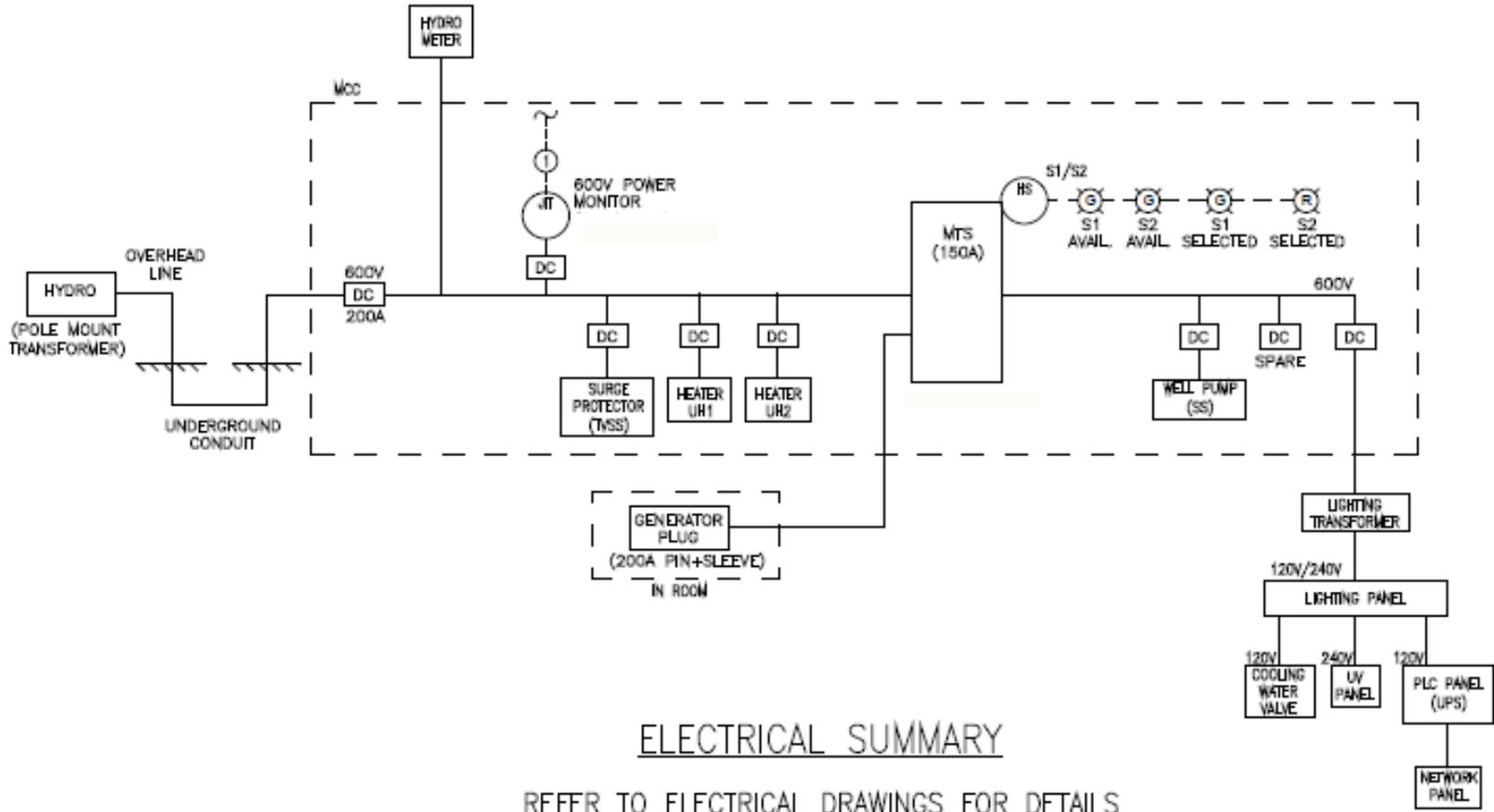
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City of Guelph



**ELECTRICAL SUMMARY**  
 REFER TO ELECTRICAL DRAWINGS FOR DETAILS

REFER TO ELECTRICAL DRAWINGS FOR DETAILS

| VERIFICATION                                 | DATE (YYYY-MM-DD) | VERIFIED BY (INIT) |
|--|-------------------|--------------------|
| VERIFIED AGAINST PHYSICAL PIPING             | 2017-11-07        | GN                 |
| VERIFIED ID AGAINST PHYSICAL IO IN PLC PANEL | 2017-11-07        | GN                 |
| VERIFIED ID AGAINST PLC PROGRAM              | 2017-11-07        | GN                 |

**REVISIONS**

| NO. | DATE | BY | DESCRIPTION |
|-----|------|----|-------------|
|     |      |    |             |

ph  
 Making a Difference

all Guelph Supply

ities

Sheet: P&ID-002  
 Title: B  
 Scale: 1:1  
 Date: 2017-11-07  
 Drawn by: J.C.  
 Checked by: J.C.  
 Project: MGT-D-WAS-PID-002  
 Consultant: N/A  
 Date and last edited by:

# Facility Drawings: Site Layout Drawings

- Site Layout drawings

## Goals

- Show locations of all devices and instrumentation at a facility
- Avoid unnecessary architectural details
- Only plan view is used
- Both tags and plain language descriptions are used for equipment
- Mounting height of equipment is shown
- Approximate scale on drawing
  
- Quickly summarizes locations of all devices/instrumentation
- Useful to orient staff with location of equipment at the site
- Useful tool for defining scopes of work for contractors/staff
- One layout drawing per site







# Facility Drawings: Electrical & I/C Drawings

- Electrical & I/C Drawings

## Goals

- Most frequently used drawings for trouble-shooting
- Treated as a “set” of drawings
- Standard order/format
- Only updated when changes are made
  
- Electrical Layout
- MCC & Lighting Panels
- Electrical Starters: Loop/Connection Diagrams
- PLC Panel Drawings
- Instrumentation Loop/Connection Diagrams
- Network Drawings

# Facility Drawings: Electrical & I/C Drawings



| SHEET | DWG.#              | DESCRIPTION  |
|-------|--------------------|--|
| 1     | MST-D-WAS-EID-001  | DRAWING INDEX  |
| 2     | MST-D-WAS-ELY-001  | ELECTRICAL EQUIPMENT LAYOUT (PLAN VIEW)  |
| 3     | MST-D-WAS-ELY-002  | ELECTRICAL MAJOR CONDUITS/JUNCTION BOXES                                       |
| 4     | MST-D-WAS-ELY-003  | LIGHTING LAYOUT (WITH SWITCHES & RECEPTACLES)                                  |
| 5     | MST-D-WAS-E00-001  | ELECTRICAL SINGLE LINE   |
| 6     | MST-D-WAS-E00-002  | ELECTRICAL MCC ELEVATION   |
| 7     | MST-D-WAS-E00-003  | ELECTRICAL LIGHTING PANEL SCHEDULE   |
| 8     | MST-D-WAS-ELP-001  | ELECTRICAL STARTER/LOOP DRAWING #1 DIGITAL POWER MONITOR                       |
| 9     | MST-D-WAS-ELP-002  | ELECTRICAL STARTER/LOOP DRAWING #2 WELL PUMP STARTER                           |
| 10    | MST-D-WAS-ELP-002A | ELECTRICAL STARTER/LOOP DRAWING #2A WELL PUMP STARTER SCHEMATIC WIRING DIAGRAM |
| 11    | MST-D-WAS-ELP-003  | ELECTRICAL STARTER/LOOP DRAWING #3 UV UNIT                                     |
| 12    | MST-D-WAS-ELP-004  | ELECTRICAL STARTER/LOOP DRAWING #4 UV COOLING WATER VALVE                      |
| 13    | MST-D-WAS-ELP-004A | ELECTRICAL STARTER/LOOP DRAWING #4A UV COOLING WATER VALVE DEVICE TERMINALS    |
| 14    | MST-D-WAS-IND-001  | SCADA NETWORK DIAGRAM  |
| 15    | MST-D-WAS-ICPI-001 | PLC PANEL LAYOUT   |
| 16    | MST-D-WAS-ICPI-002 | PLC PANEL TERMINAL BLOCK LAYOUT & BOM  |
| 17    | MST-D-WAS-ICPI-003 | PLC PANEL POWER DISTRIBUTION   |
| 18    | MST-D-WAS-ICPI-004 | PLC PANEL PLC RACK LAYOUT  |
| 19    | MST-D-WAS-ICPI-005 | PLC PANEL POWER SUPPLY & SLOT 0  |
| 20    | MST-D-WAS-ICPI-006 | PLC SLOT NO. 1 & 2   |
| 21    | MST-D-WAS-ICPI-007 | PLC SLOT NO. 3 & 4   |
| 22    | MST-D-WAS-ICPI-008 | PLC SLOT NO. 5 & 6   |
| 23    | MST-D-WAS-ICPI-009 | PLC SLOT NO. 7   |
| 24    | MST-D-WAS-ICPI-010 | PLC SLOT NO. 8   |
| 25    | MST-D-WAS-ICPI-011 | PLC SLOT NO. 9   |
| 26    | MST-D-WAS-ILP-001  | LOOP DRAWING #1 HYPO PUMP  |
| 27    | MST-D-WAS-ILP-002  | LOOP DRAWING #2 HYPO TANK LEVEL  |
| 28    | MST-D-WAS-ILP-003  | LOOP DRAWING #3 POE CHLORINE ANALYZER  |
| 29    | MST-D-WAS-ILP-004  | LOOP DRAWING #4 WELL POE/FLOWMETER   |
| 30    | MST-D-WAS-ILP-005  | LOOP DRAWING #5 POE SYSTEM PRESSURE  |
| 31    | MST-D-WAS-ILP-006  | LOOP DRAWING #6 BUILDING AMBIENT TEMPERATURE                                   |
| 32    | MST-D-WAS-ILP-007  | LOOP DRAWING #7 SECURITY SYSTEM  |
| 33    | MST-D-WAS-ILP-008  | LOOP DRAWING #8 SMOKE DETECTOR   |
| 34    | MST-D-WAS-ILP-009  | LOOP DRAWING #9 WELL LEVEL PROBE   |

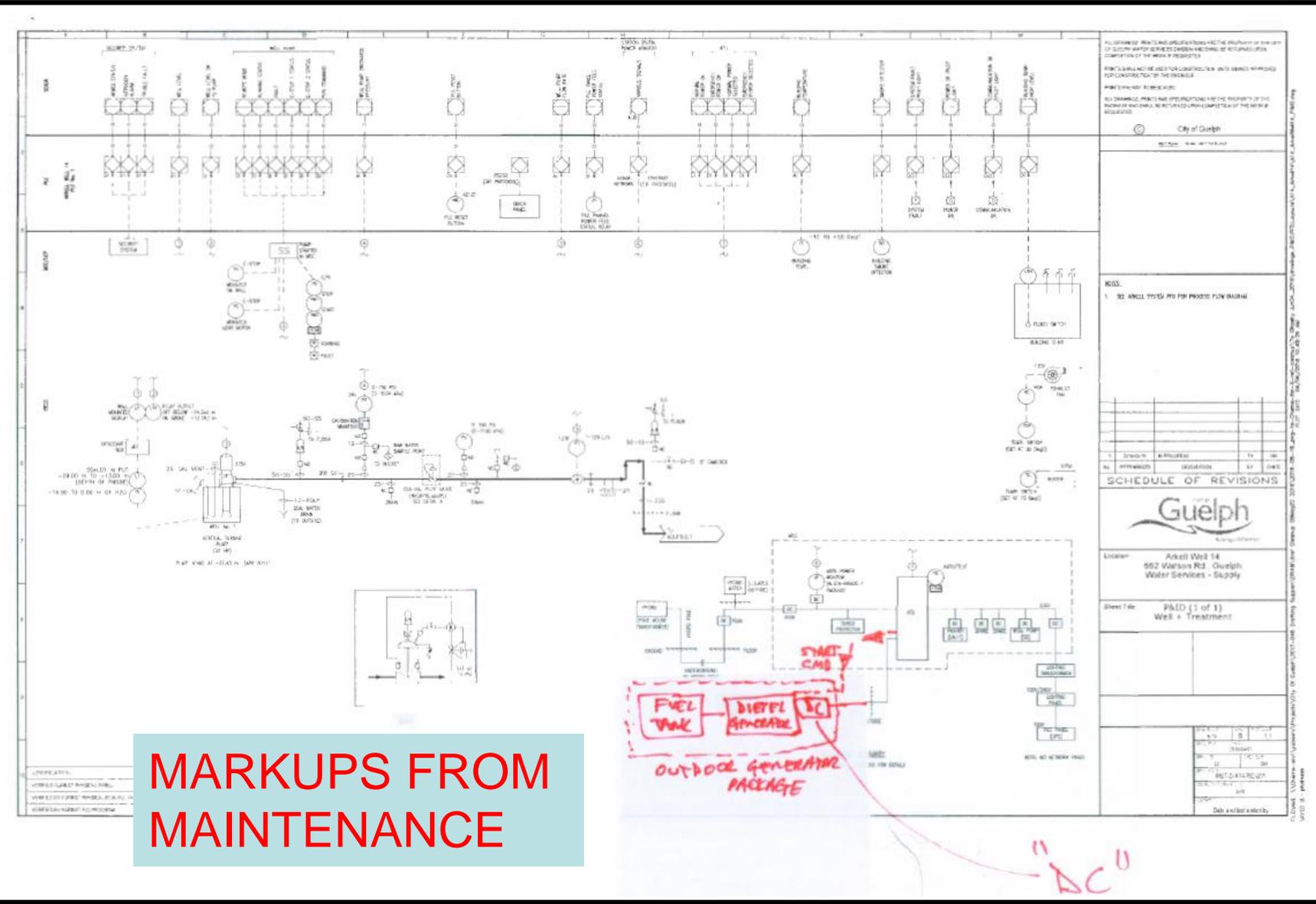
ALL DRAWINGS, PRINTS AND SPECIFICATIONS ARE THE PROPERTY OF THE CITY OF GUELPH WATER SERVICES DIVISION AND SHALL BE RETURNED UPON COMPLETION OF THE WORK IF REQUESTED.  
 PRINTS SHALL NOT BE USED FOR CONSTRUCTION UNLESS SIGNED APPROVED FOR CONSTRUCTION BY THE ENGINEER.  
 PRINTS ARE NOT TO BE SCALED.  
 ALL DRAWINGS, PRINTS AND SPECIFICATIONS ARE THE PROPERTY OF THE ENGINEER AND SHALL BE RETURNED UPON COMPLETION OF THE WORK IF REQUESTED.

City of Guelph Inc.  
 101-1141, 1142, 1143, 1144, 1145, 1146, 1147, 1148, 1149, 1150, 1151, 1152, 1153, 1154, 1155, 1156, 1157, 1158, 1159, 1160, 1161, 1162, 1163, 1164, 1165, 1166, 1167, 1168, 1169, 1170, 1171, 1172, 1173, 1174, 1175, 1176, 1177, 1178, 1179, 1180, 1181, 1182, 1183, 1184, 1185, 1186, 1187, 1188, 1189, 1190, 1191, 1192, 1193, 1194, 1195, 1196, 1197, 1198, 1199, 1200, 1201, 1202, 1203, 1204, 1205, 1206, 1207, 1208, 1209, 1210, 1211, 1212, 1213, 1214, 1215, 1216, 1217, 1218, 1219, 1220, 1221, 1222, 1223, 1224, 1225, 1226, 1227, 1228, 1229, 1230, 1231, 1232, 1233, 1234, 1235, 1236, 1237, 1238, 1239, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 1247, 1248, 1249, 1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1258, 1259, 1260, 1261, 1262, 1263, 1264, 1265, 1266, 1267, 1268, 1269, 1270, 1271, 1272, 1273, 1274, 1275, 1276, 1277, 1278, 1279, 1280, 1281, 1282, 1283, 1284, 1285, 1286, 1287, 1288, 1289, 1290, 1291, 1292, 1293, 1294, 1295, 1296, 1297, 1298, 1299, 1300, 1301, 1302, 1303, 1304, 1305, 1306, 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# Keeping Facility Drawings Up to Date

- Drawings updated once per year
  - PDF copies are stored in a Document Management System
  - AutoCAD files are maintained by SCADA Department (GIT revision control)
  - Updated PDFs are generated once per year
- Storage
  - “Official PDF copy” is in the Document Management System
  - Paper print out at each facility in O&M binder, updated once per year
- Maintenance Work Flow
  - When maintenance works on a system, they print out the PDF drawing and mark it up with a red pen – paper markups given to SCADA Department
  - For major updates, new PDF copies are issued
  - For minor updates, wait until annual update or as time permits

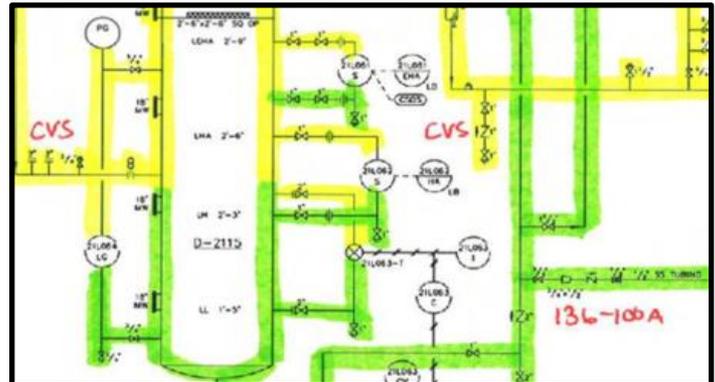
# Keeping Facility Drawings Up to Date



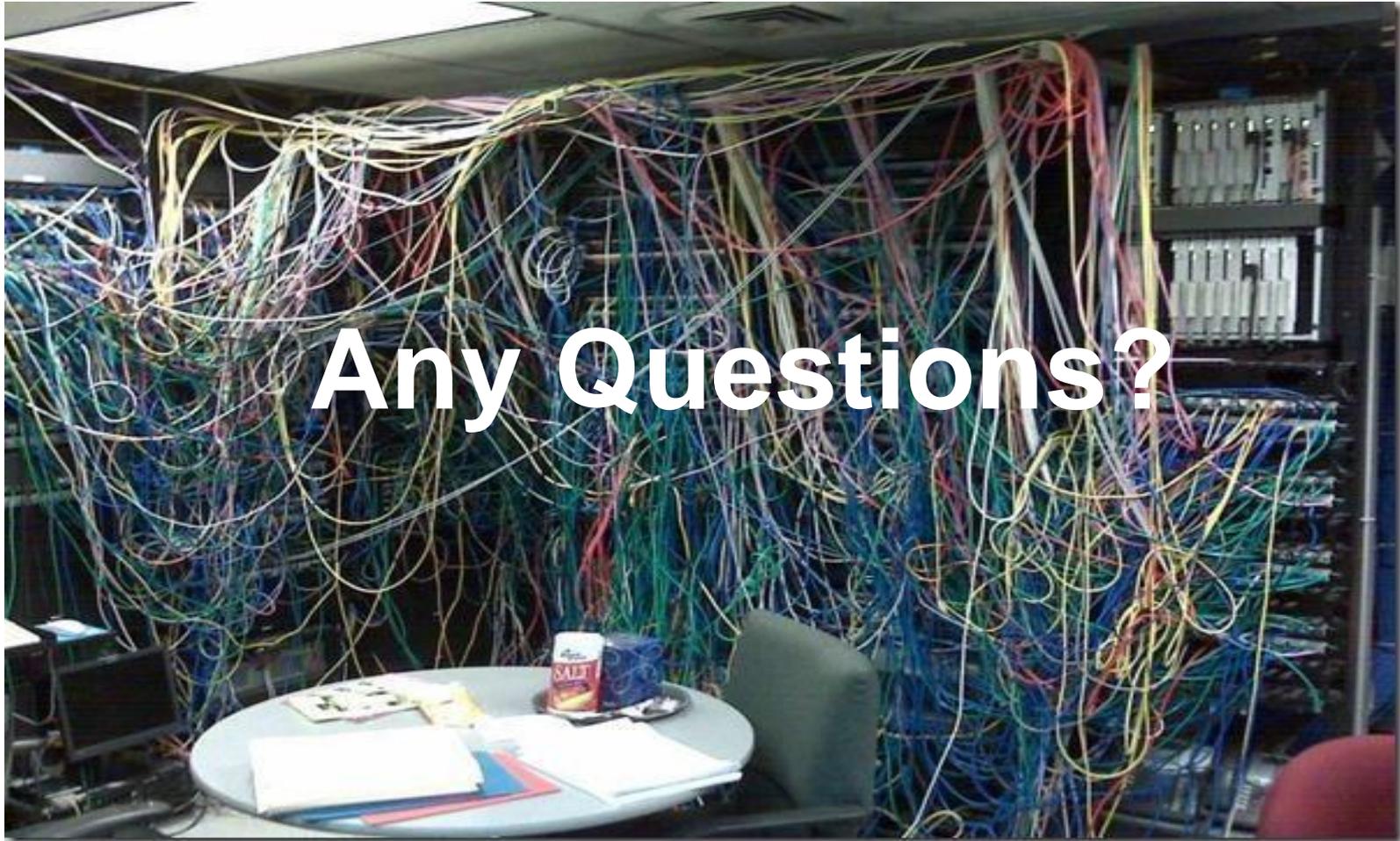
**MARKUPS FROM MAINTENANCE**

# Keeping Facility Drawings Up to Date

- Annual Verifications
  - Each Year 20% of the P&IDs, PFDs and Layouts are Yellow-lined on site
  - For remaining 80% of drawings, a quick desk-based verification is done
  - Edits made as needed, and new PDF drawings issued with an updated ate
  
- Yellow-lining
  - Print out drawing and use a yellow highlighter to trace over lines as they are verified
  - Observed changes are marked up in red-pen
  - The AutoCAD drawing is then updated
    - Update “Verifications” schedule & “Revisions” schedule on drawing
    - Revision comment stays as “AS FOUND”



| 10 | VERIFICATION                                   | DATE (YYYY-MM-DD) | VERIFIED BY (INIT) |
|----|--|-------------------|--------------------|
|    | VERIFIED AGAINST PHYSICAL PIPING               | 2017-11-07        | GN                 |
|    | VERIFIED I/O AGAINST PHYSICAL I/O IN PLC PANEL | 2017-11-07        | GN                 |
|    | VERIFIED I/O AGAINST PLC PROGRAM               | 2017-11-07        | GN                 |



**Any Questions?**

\* No facility drawings for this system (yet)